THE INDEPENDENT GUIDE TO IBM-STANDARD PERSONAL COMPUTING

$2.95/$3.95 CANADA & FOREIGN

PC MAGAZINE

VOLUME 7 NUMBER 13
JULY 1988

Free TSR: Total Serial Port and Video Control—SETMODE Delivers!

VGA: Don't Settle For Less

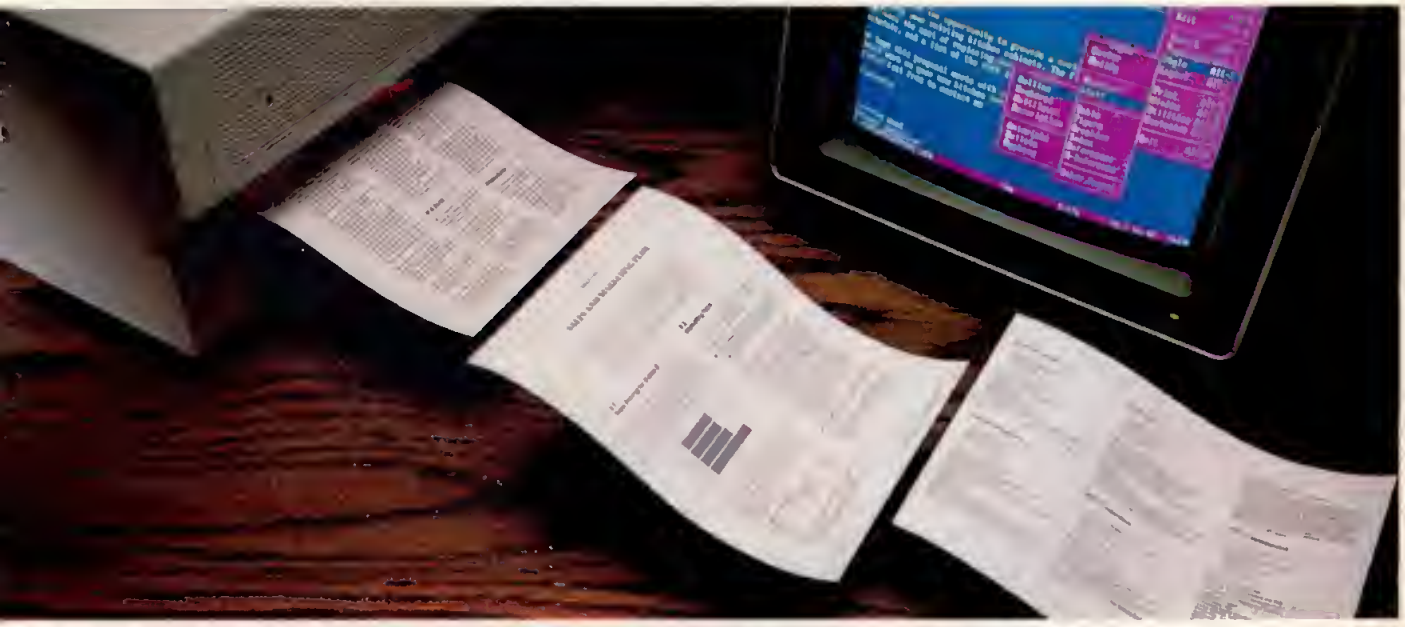
PC Labs Tests 9 New Boards

- Scientific Word Processors: Formulas for Success
- Plus:
  21 Programmable Comm Packages
  9 Budget ATs
- First Looks: Toshiba T5100 Packs 386 Power For the Road

0 71486 02391 3 30

New from Borland,

Introducing *Sprint*®, the fast track to performance word processing



You're on the fast track because Sprint races through your work much faster than other word processors. And you're on the fast track because you can learn Sprint in a hurry—whether you've *ever* used a word processor or *never* used a word processor.

Sprint: The Professional Word Processor!

BORLAND
INTERNATIONAL

You turn professional when you *Sprint!*

Ease into the future with *Sprint* today

Sprint works with today's hardware and will work with tomorrow's. Anywhere from an 8088 PC through a 386.

It's already a major success story in Europe; it's the #1 selling word processor in France (and everyone knows, 50 million Frenchmen can't be wrong!) Sprint is proof that the world *did* need another word processor.

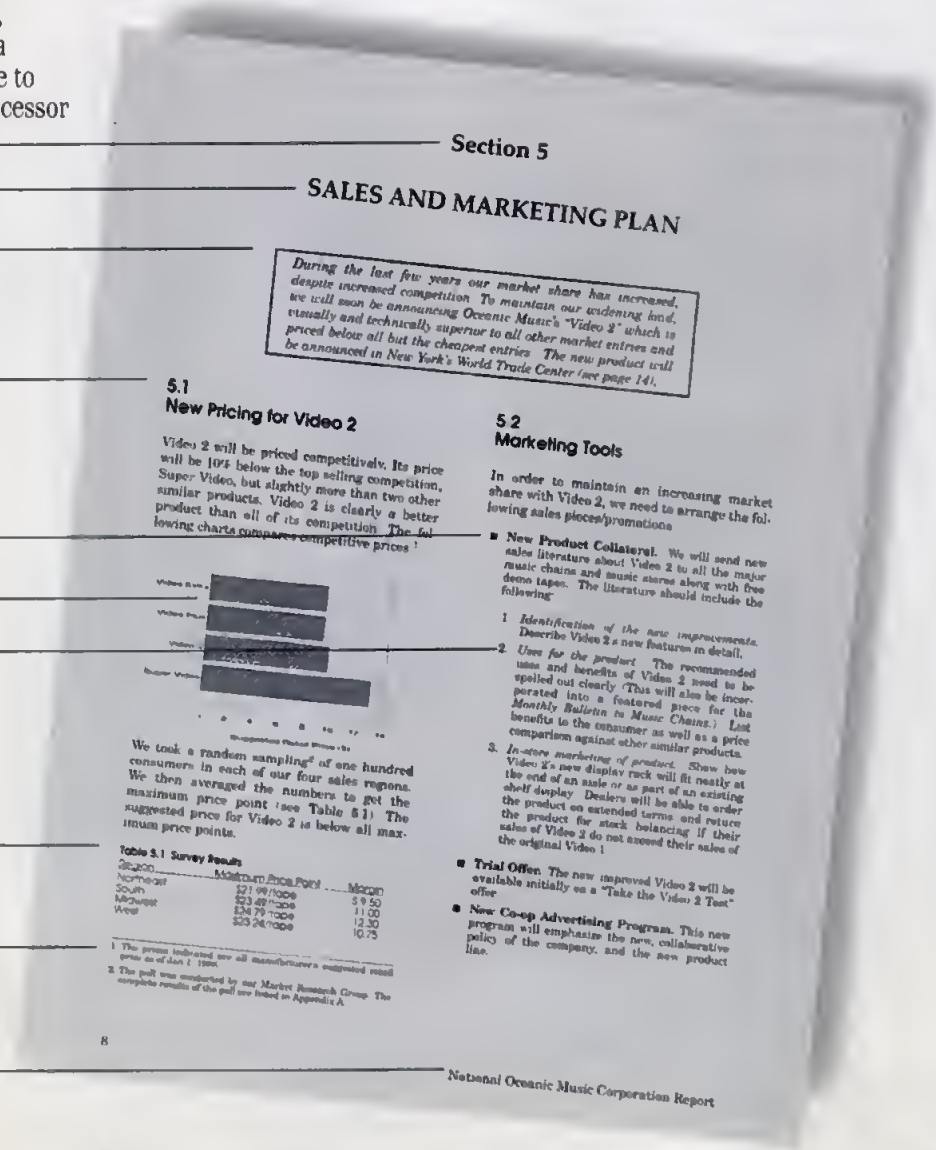
Sprint is so sophisticated, it's simple. It won't terrify a beginner; it's a familiar face to many experienced word processor users who can now get much better, faster results *without having to learn a new program.*

It's so flexible, businesses can standardize on Sprint without losing a thing or having to re-train.

It's so powerful that "power users" will never be hungry for power again because they can customize to their hearts' content.

And it's a remarkable value at $199.95 instead of the $400, $500, $600 some companies want—*and* for a limited time only, we throw in Alternative User Interfaces compatible with the command procedures of WordStar, MultiMate, Microsoft Word, WordPerfect, SideKick and EMACS. All this for an introductory price of only $199.95 suggested retail.

Sprint. It's the word processor you'd expect from Borland and the value you'd expect from Borland. It's time to *Sprint* on the fast track.



Chapter Heading

Section 5

Scalable Font

SALES AND MARKETING PLAN

Box Drawing

During the last few years our market share has increased, despite increased competition. To maintain our widening lead, we will soon be announcing Oceanic Music's "Video 2" which is visually and technically superior to all other market entries and priced below all but the cheapest entries. The new product will be announced in New York's World Trade Center (see page 14).

Section Heading

5.1
New Pricing for Video 2

Video 2 will be priced competitively. Its price will be 10% below the top selling competition, Super Video, but slightly more than two other similar products. Video 2 is clearly a better product than all of its competition. The following charts compares competitive prices.[1]

Automatic Bulleted List

PostScript® Graphics

Automatic Numbered List

We took a random sampling[2] of one hundred consumers in each of our four sales regions. We then averaged the numbers to get the maximum price point (see Table 5.1). The suggested price for Video 2 is below all maximum price points.

Automatic Table-Referencing

Table 5.1 Survey Results

Region	Maximum Price Point	Margin
Northeast	$21.99/tape	$9.50
South	$23.49/tape	11.00
Midwest	$24.79/tape	12.30
West	$23.24/tape	10.75

Footnote Capability

1 The prices indicated are all manufacturer's suggested retail prices as of Jan 1, 1988.

2 The poll was conducted by our Market Research Group. The complete results of the poll are listed in Appendix A.

5.2
Marketing Tools

In order to maintain an increasing market share with Video 2, we need to arrange the following sales pieces/promotions

- **New Product Collateral.** We will send new sales literature about Video 2 to all the major music chains and music stores along with free demo tapes. The literature should include the following:
  1. *Identification of the new improvements.* Describe Video 2's new features in detail.
  2. *Uses for the product.* The recommended uses and benefits of Video 2 need to be spelled out clearly. (This will also be incorporated into a featured piece for the *Monthly Bulletin to Music Chains.*) List benefits to the consumer as well as a price comparison against other similar products.
  3. *In-store marketing of product.* Show how Video 2's new display rack will fit neatly at the end of an aisle or as part of an existing shelf display. Dealers will be able to order the product on extended terms and return the product for stock balancing if their sales of Video 2 do not exceed their sales of the original Video 1.
- **Trial Offer.** The new improved Video 2 will be available initially on a "Take the Video 2 Test" offer.
- **New Co-op Advertising Program.** This new program will emphasize the new, collaborative policy of the company, and the new product line.

8

Page Footing

National Oceanic Music Corporation Report

400%

Introducing our newest family of 9-wire dot-matrix printers. The re-engineered MSP series, featuring the latest advances in print technology.

To begin with, they're 50% faster. In the draft printing mode, the MSP-40 and 45 top out at 240 cps. And the MSP-50 and 55 have a maximum cruising speed of 300 cps.

Each model features a new, bidirectional print mechanism, that can generate brilliant graphics resolution. And the new MSP-50 and 55 can produce crisp, near-letter-quality print with even better throughput.

We also made it easier to load the MSP series.

The paper bale has been replaced with a built-in convertible push or pull paper tractor. And the sleek new redesign

New.

now incorporates a rear or bottom feed. Real handy if you're printing labels, forms, cards or stationery.

As for convenience, you'll also appreciate the front panel controls, the outstanding compatibility and the wide selection of typestyles via available font cards. There's even color capability on the deluxe MSP-50 and 55.

All in all, the MSP series, with an 18-month warranty, represents an excellent value in precision-built printers. Which, considering Citizen's tradition, isn't all that new.

For the dealer nearest you, call 1-800-556-1234, Ext. 34. In California, call 1-800-441-2345, Ext. 34.

© 1988 Citizen America Corporation. Citizen and the Citizen logo are trademarks of Citizen Watch Co., Ltd.

CITIZEN™

Printers that run like clockwork.

CIRCLE 114 ON READER SERVICE CARD

The Experts' Choice

Vopt™
Disk Organizer

"The best disk optimizer I've seen, it quickly unfragments your hard disk and keeps it as fest es it is supposed to be."
Bernie Zilbergeld
Computer Currents

"Vopt is fest, sefe, effective, and even fun to use. Whet more could you want?"
Glenn Hart
PC Magazine

"There are several disk manegement programs aveileble, but the one I use is Golden Bow's Vopt."
Jerry Pournelle
Byte

"In three yeers of reting software, I've never given a product e 10—until now."
Vincent Flanders
Access 88

"Vopt is very, very FAST. Golden Bow Systems has a winner here. No choice. In stend-elone disk optimizers, Vopt is Vbest."
John G. Scherb
Tokyo PC Newsletter

Vopt is the fast, safe, disk organizer that unfragments your disk files to improve the performance of your hard and floppy disks.

Vopt is loaded with additional programs that test and report on the efficiency of your system.

Call toll free and receive a free demo disk that will show just how fast Vopt will work for you!

$59.95 $3 shipping/handling
CA add 6.5% sales tax

GOLDEN BOW SYSTEMS

2870 Fifth Avenue
Suite 201
San Diego, CA 92103
800/284-3269

Vopt is a trademark of Golden Bow Systems

CIRCLE 369 ON READER SERVICE CARD

VOLUME 7 NUMBER 13

WHAT'S INSIDE

In this issue, *PC Magazine* makes good on a promise Bill Machrone made back in February. A reader had written to suggest that we include more remarks about the concems of scientists in our regular stories, and Machrone responded that reporting on the advanced features that serve scientists will help all readers make more-informed purchasing decisions. So we thought: Why not conclude our roundup of word processors with a look at new and better ways of working with scientific and technical material?

Two greal communicalors: PC Labs project leader Frank Mitard and contributing edilor M. David Slone.

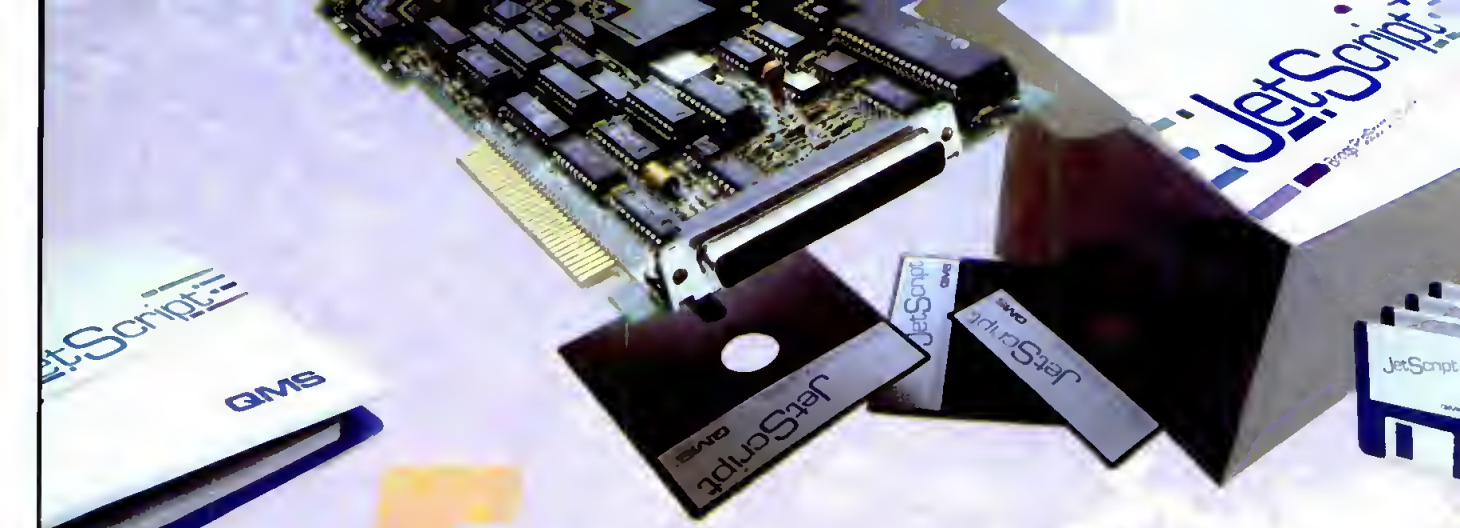
The 12 programs we review in "Scientific Word Processors: Formulas for Success" simplify the writing and editing of equations both mathematical and chemical—the elements that are vital to technical publishing. Anyone who has worked with the predecessors of these packages will appreciate the gains in usability and functionality within this product category. And anyone who has ever been frustrated trying to use a general-purpose WP to format an occasional equation or two may find the right secondary package among this group.

MAKING WAY FOR VGA Just as scientific word processors are achieving maturity and moving into the mainstream of desktop computing, VGA display adapters are developing the potential of making any office a room with a colorful view. In our cover story, contributing editor Winn L. Rosch reviews nine low-cost register-compatible VGA boards that take the next step in bringing the VGA standard to PCs, XTs, and ATs. Says Rosch, "Now the glass doesn't have to be greener on the other side of the office where that other guy has a new PS/2 and VGA technology—and you don't." Rosch's point: VGA is a standard PC users no longer can afford to envy.

Finally, we look at 21 communications programs that feature powerful script languages. One of the challenges of working on this story, according to contributing editor M. David Stone and PC Labs project leader Frank Mitard, was settling on definitions for Xmodem and Ymodem protocols and their variants, which are given different names by two camps of communications experts. Says Stone, "If we simply used the protocol labels the vendors use, it would be like comparing apples and oranges and calling them peaches." After long conversations with Chuck Forsberg—the creator of Ymodem—and with software vendors, Stone and Mitard decided to adopt conventions that side with neither school. Will that end the debate or just fuel it anew? We'll let you know.

PC Magazine The Independent Guide to IBM Standard Personal Computing ISSN (#0888 8507) is published bi-weekly except in July and August for $39 97 for one year (22 issues), $61 97 for two years and $81 97 for three years Additional postage $1 00 per copy or $22 00 per year for Canada and all other foreign countries. Ziff Davis Publishing Co a division of Ziff Communications Co One Park Ave , New York NY 10016 Second-Class postage paid at New York NY 10016 and at additional mailing offices POSTMASTER Address changes to *PC Magazine*, P O Box 54093, Boulder, CO 80321-4093

Photograph Thom O'Connor



Everything it takes to add PostScript to your LaserJet II, including HP's blessing.

Hewlett-Packard® and QMS® have made it easy to give your LaserJet Series II® the desktop publishing power of the PostScript® page description language.

The new QMS JetScript™.

JetScript is the only Adobe PostScript controller upgrade authorized by HP and designed specifically for the LaserJet Series II. JetScript gives your printer the industry-standard page description language to accompany HP's PCL printer language. This expands your laser printing capabilities. Increases overall printer performance. Yet preserves HP functionality and warranties.

Do it yourself JetScript is easy to install. Just plug in two cards (one in your personal computer*, the other in your printer), connect a cable and install the software.

The result is a PostScript system with 35 resident Adobe typefaces, three megabytes of RAM, and QMS ASAP™ (Advanced System Architecture for PostScript) proprietary technology for superior performance. All for less than half the cost of a new PostScript laser printer.

New forms of expression The speed and power of JetScript combine to give your LaserJet Series II a form of expression that's found only with PostScript.

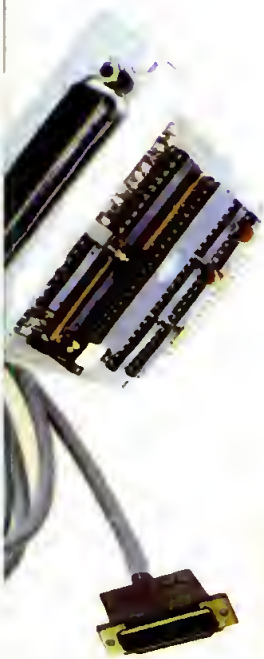
Simply, PostScript opens up the full range of possibilities for desktop publishing. You have complete control over the final look of the page, down to the last exacting detail. PostScript allows for an infinite number of font variations and sizes. That makes PostScript's limitless flexibility and power the perfect complement to your LaserJet Series II, giving you the high-quality output you require.

Impressive results People have come to expect impressive results from QMS—one of the first companies to bring the power of PostScript to laser printing, and now with more PostScript-based products than any other company.

You'll get the same results from the new JetScript. After all, it has HP's blessing.

Laser Connection is a sales and marketing subsidiary of QMS. Call **1-800-523-2696** for the location of your nearest Laser Connection dealer.

**JetScript available for IBM PC-XT®, IBM PC-AT®, HP Vectra™ and compatible personal computers, or the IBM PS/2™ Model 30.*



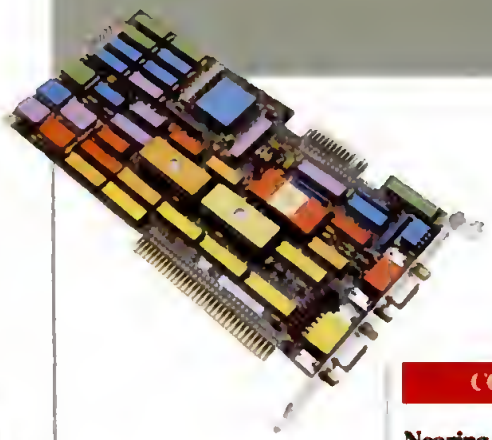
LASER CONNECTION™

A QMS® Company

CIRCLE 259 ON READER SERVICE CARD

The following are trademarks of their respective companies: HP, Hewlett-Packard, LaserJet Series II, HP Vectra of Hewlett-Packard. QMS, JetScript, ASAP, Laser Connection of QMS, Inc. PostScript of Adobe Systems. IBM PC-XT, IBM PC-AT and IBM PS/2 of International Business Machines Corp.

©1987 Laser Connection



PC MAGAZINE

COVER STORY

Nearing Perfection: VGA Boards Enter the Mainstream
Winn L. Rosch/ Transform your PC's screen from dull to dazzling. This second wave of VGA-compatible display adapters from Everex Systems, Intelligent Data Systems, Orchid Technology, Paradise Systems, Sigma Designs, Tatung Co. of America, Taxan USA, Tecmar, and Video Seven will make your PC's color and resolution rival a
PS/2's 93
Features Table 95
Performance Tests 102

VGA boards sharpen the resolution standard, page 93.

Nine ATs in competition, page 207.

FEATURES

Scientific WPs blend technical symbols and text, page 251.

COMMUNICATIONS
PC Communications Comes of Age
M. David Stone/ Automate your communications or build new features into your system with the new generation of communications software. Our reviewers examine 21 script language programs that offer the kind of versatility you'd expect to see only in a
programming language 127
Features Table 140
Performance Tests 151

COMPUTERS
The Niche Factor: Nine ATs Compete for Market Share
Donald P. Willmott/ Some slash prices and others add features, but all nine of these AT compatibles are looking for ways to capture a piece of the competitive AT
marketplace 207
Features Table 208
Performance Tests 238

WORD PROCESSING
Scientific Word Processors: Formulas for Success
Jim Seymour/ Simplify the integration of text and technical character sets with one of the 12 scientific WPs reviewed here. Contributing editor Jim Seymour traces the evolution of these word processors from Donald Knuth's complicated TEX to the more-sophisticated products available
today 251
Features Table 266
Performance Tests 300

EDITORIAL PRODUCT INDEX
The complete listing of products reviewed in this issue, plus a quick reference to utilities, programs, and tips in
the Productivity section ... 513

Cover Photograph:
Roberto Brosan

FIRST LOOKS

Hands On:

- The Toshiba T5100 squeezes 386 performance and 2MB RAM into a laptop chassis
- *IZE*, from Persoft, adds new twist to managing free-form information
- Emerald Bay's *Data Base Administrator* and *Eagle*
- An inexpensive 20-MHz tower from Northgate
- Ashton-Tate's *Draw Applause* enters the presentation graphics arena
- *The Image Printing Utilities* teach 9-pin dot matrix printers new tricks
- *Tree86* hard disk organizer, excellent mouse support
- Super Cartridge I replaces 23 HP cartridges
- *Dan Bricklin's Demo II Program*
- CuRAM 80-8: memory for the Model 80 33

AFTER HOURS

- *Campaign Promises* lets you make a run for the presidency
- Three genealogy programs for tracing your family tree
- *Bob and Jean Anderson's Computer Stretches*, the PC's answer to Jane Fonda and Richard Simmons 524

Genealogy programs track your past, in After Hours, page 524.

PRODUCTIVITY

PC LAB NOTES
Instant Speedup for Your PC
Brian K. Roemmele/ A simple software technique can boost your computer's performance. Learn how postponing the refresh cycle squeezes extra speed from memory 331

UTILITIES
Communications and Video Setup with SETMODE FREE PROGRAM
Tom Kihlken/ Presenting a resident utility that makes the tricky job of setting your video mode and communications parameters a lot faster and simpler 351

PC MAGAZINE HELP FILE 337

ENVIRONMENTS
Introducing the OS/2 Presentation Manager
Charles Petzold/ A first look at OS/2 1.1, whose graphics-based interface will make software easier to use 379

POWER PROGRAMMING
Keeping Filenames Fully Qualified
Ray Duncan/ Storing incomplete filenames in full drive-and-path form 397

SPREADSHEET CLINIC
Douglas Cobb and Steven Cobb/ Instantly editing records using an undocumented Query key function 413

USER-TO-USER
Salvatore P. Ricciardi/ Automating program development using batch files; important warnings about using the DOS APPEND command with BASICA 419

POWER USER
Craig L. Stark/ Identifying the current drive and subdirectory in *dBASE III Plus* and *Clipper*; creating *WordPerfect* concordance files 427

LANGUAGES
Robert L. Hummel/ A simple program to merge C code with the compiler's assembler output; creating custom character fonts in BASIC .. 435

PC TUTOR
Robert L. Hummel/ Understanding the bad sectors on your hard disk; running monochrome and color monitors simultaneously .. 447

CONNECTIVITY CLINIC
Frank J. Derfler, Jr./ Finding an ARCnet station address with BASIC and an Ethernet address using C; terminating printer spooling in commercial programs automatically ... 453

VIEWPOINTS

LETTERS TO PC MAGAZINE 15

PC ADVISOR
Mitt Jones/ Separating keyboard and monitor from system unit; QMS JetScript adds PostScript capability to your HP LaserJet Series II; an AT&T-sponsored bulletin board for AT&T 6300 users 27

BILL MACHRONE
In Your (Inter)Face 65

JOHN C. DVORAK
Confessions of a Power User 71
Inside Track 73

JIM SEYMOUR
386 PCs: Redefining the Workstation 77

STEPHEN MANES
Extension Course: Filenames for the Future 85

Direct Marketing Connection 461
Reader Service Card .. 515
Advertisers' Product Index 517
Index to Advertisers ... 523

PC MAGAZINE

Editor-in-Chief and Publisher Bill Machrone
Associate Publisher J. Samuel Huey

Executive Editors Bill Howard, Luisa Simone, Gus Venditto

Workgroup Systems Editor Frank J. Derfler, Jr.
West Coast Editor Jared Taylor
Senior Editor Nora Georgas
Senior Technical Editor Robert L. Hummel
Senior Editor, Technical Columns Craig L. Stark
Assistant Managing Editors Greg Pastrick, Paul B. Ross
Manager, Copy Edit Linda Louk
Technical Editor Salvatore P. Ricciardi
Associate Editors Carol Ellison, Robbin Juris, Catherine D. Miller, Trudy Neuhaus, Donald P. Willmott
Production Editor Diane D'Angelo
Assistant Production Editor Karen A. Carter
Staff Editors Mitt Jones, Jonathan Matzkin, Edward L. Perratore
Assistant Editors Robert Barnett, Glen Becker, Michael Cohn, Carole Goldstein, Stephanie K. Losee, Lonnie Lum, Paul V. Olowacz, Ann Ovodow, M. Stephanie Ricks, David Rosen, Jennifer Zaino
Editorial Assistants Fredric Burke, Stephanie Izarek, Michael W. Muchmore, Ilona Price, Paula Seefeldt
Proofreaders Meakin David Armstrong, P. J. Springer
Editorial Secretary Donna Alfred
Business Manager Tom McGrade
Assistant to the Publisher David Baker
Administrative Assistants Christina Okang, Frieda T. Smallwood
Database Assistant Dolores Williams
Contributing Editors Frank Bican, Douglas Cobb, Steven Cobb, Ray Duncan, John C. Dvorak, Glenn A. Hari, Stephen Manes, Michael J. Mefford, Edward Mendelson, Barry Owen, Charles Petzold, Jeff Prosise, Winn L. Rosch, Neil J. Rubenking, Jim Seymour, M. David Stone, Ethan Winer

Manager, PC MagNet Christopher Barr
PC MagNet Assistant Manager Wendy W. Huang

Director, Art and Design Mary Zisk
Associate Art Director Denise Platkin
Art Editor Mariano Nicieza
Assistant Art Director Natalie Chu
Layout Artists Leigh Margerison, Amy B. Williamson

Director, Graphics and Electronic Publishing Gerard Kunkel
Senior Graphic Designer Laurie Wance
Graphic Designer Charles Conover
Graphic Artist Gerard Sarrantonio

Director, PC Labs John Dickinson
Manager, PC Labs Bruce Freeman
Project Leaders Pamela J. Milland, Francis P. Mitard, Bill O'Brien, Philip F.H. Rose
System Support Specialists Robert W. Kane, Charles Rodriguez
Inventory Control Manager John R. Delaney
Inventory Control Technicians Peter Baslide, Leon Newman
Receptionist Karen Williams

Marketing Director Jeff Ballowe
Marketing Manager Ellen Atkinson

Public Relations Director Jessica Kersey
Public Relations Coordinator Stacy O'Connell

Single Copy Sales Director Bob Woltersdorf
Retail Sales & Marketing Manager Carol Benedetto
Circulation Manager Charles Mast
Circulation Coordinator Robert Smahl

Editorial Production Supervisor Dorothy Chiffriller
Advertising Production Supervisor Susan DePierro
Advertising Production Managers Susan Livoti, Vicki Egan Root
Advertising Production Assistants Michael Genzale, Christine Rottmund
Editorial Production Coordinator Dennis Fitzgerald
Production Systems Supervisor Linda Harms
Production Systems Staff Melvin Foster-Poetsch, Sharon Terdeman

Group Vice President William Lohse

Advertising Office One Park Ave., New York, NY 10016, (212) 503-5100

ZIFF-DAVIS PUBLISHING COMPANY

President Kenneth H. Koppel
Group Vice Presidents William Lohse, J. Scott Briggs
Senior Vice President, Marketing Paul H. Chook
Vice President, Operations Baird Davis
Vice President, Controller John Vlachos
Vice President, Creative Services Herbert Stern
Vice President, Research Marian O. White
Vice President, Circulation Bert Lacy
Vice President, Circulation Services James Ramaley
Vice President, Marketing Services Ann Pollak Adelman
Vice President, Classified Advertising Alicia Marie Ivans
Vice President, Development Seth Alpert
Director of Planning Gary A. Gustafson
Production Director Walter J. Terlecki

ZIFF COMMUNICATIONS COMPANY

Chairman Philip B. Korsant
President Kenneth H. Koppel
Executive Vice President Stephen C. Kahler
Senior Vice Presidents Philip Sine, Hugh Tietjen
Vice Presidents William Phillips, J. Malcolm Morris, Steven C. Feinman
Secretary Bertram A. Abrams

HOW TO CONTACT THE EDITORS

The editors of *PC Magazine* want to hear from you. Complaints, questions, and, of course, compliments should be sent by letter to One Park Ave., New York, NY 10016—it's probably the best way to reach us. You can also reach us electronically via MCI Mail (our account number is 157-9301) or by leaving a note on our Interactive Reader Service when you've finished downloading the latest utility. If nothing but a human voice will satisfy you, call us at (212) 503-5255.

We are unable to look up stories from past issues, recommend products, or diagnose problems with your PC by phone. If you bought a product advertised in *PC Magazine*, are dissatisfied, and can't resolve the problem, write (do not call) Jennifer Carratu, Advertising Department, at One Park Ave. Include *copies* of correspondence.

PC Magazine is under no obligation to review unsolicited products. All submissions accepted for publication become the property of *PC Magazine*.

PC MAGNET

PC MagNet, an on-line service, is a source for *PC Magazine*'s utilities (both programs and source code), the PC Labs Benchmark Test programs, and an index of articles printed in the magazine. Callers can upload submissions to *PC Magazine*'s Productivity section and join forums to discuss articles printed in *PC Magazine* with the authors and other readers. PC MagNet provides electronic mail and a gateway to CompuServe. For more information see the Productivity section or call (212) 503-5221.

PERMISSIONS, REPRINTS

Material in this publication may not be reproduced in any form without permission. If you want to quote from an article, use *PC Magazine*'s logo in conjunction with an Editor's Choice designation, or reprint an article, call or write Jean Lamensdorf, Reprints Manager, One Park Ave., New York, NY 10016, (212) 503-5448.

SUBSCRIPTION QUESTIONS

If you want to subscribe to *PC Magazine*, if you have a question about your subscription, or if you're moving, call or write: PC Magazine, P.O. Box 54093, Boulder, CO 80322; (303) 447-9330. A 1-year subscription (22 issues) costs $39.97; 2 years, $65.97. Canada and foreign add $1 per issue or $22.00 per year. New subscriptions and address changes take 6 to 8 weeks to process. For back issues, write Kim Armstrong, Back Issues Department, PC Magazine, One Park Ave., New York, NY 10016. Send $8 per issue (check or money order, $9 outside the U.S.).

Editorial and Business Office: One Park Ave., New York, NY 10016. Editorial (212) 503-5255, Advertising (212) 503-5100. *PC Magazine* is an independent journal, not affiliated in any way with International Business Machines Corporation. IBM is a registered trademark of International Business Machines Corp. Entire contents Copyright © 1988 Ziff-Davis Publishing Co., a division of Ziff Communications Co. All rights reserved; reproduction in whole or in part without permission is prohibited. The following are trademarks of Ziff Communications Co.: PC, PC: The Independent Guide to IBM-Standard Personal Computing, *PC* Magazine, PC Mart, PC Labs, PC Communiqués, PC Tutor, User-to-User, Power User, Power Programming, Spreadsheet Clinic, The PC Utilities, PC Lab Notes, PC Advisor, First Looks, PC Pipeline, PC MagNet.

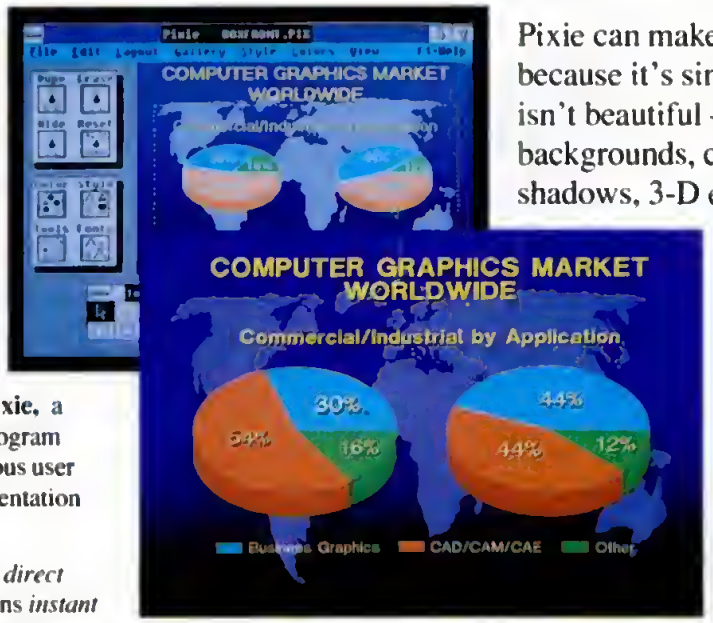
BPA

Beautifully Simple

Simply Beautiful

Consider this: How many Pixie menu selections does it take to create a complete bar chart – with annotation, axes, title, and legend? Just *one*.

How many menu selections are needed to change the bar values? Add to the title? Change the axis scaling? Add more bars? Would you believe... *none*.



Zenographics introduces Pixie, a new charting and drawing program with the simplest, most obvious user interface yet devised for presentation graphics.

In technical terms, it's called *direct manipulation.* To you, it means *instant learning* – and because it's so visual, Pixie is one program you'll never forget how to use.

Based on Microsoft® Windows, we think Pixie is the best example yet, in any software category, of the power of the graphical user interface.

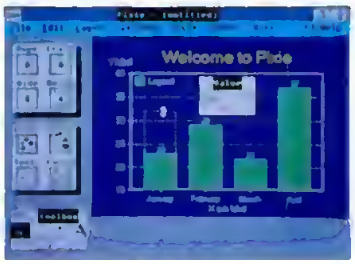
Deep down, you know why you invest in graphics: you want to look good. You want to impress, to entertain, to inform, to *sell.*

Pixie can make you look good. Just because it's simple doesn't mean it isn't beautiful – great color, shaded backgrounds, clean typefaces, drop shadows, 3-D effects, and more.

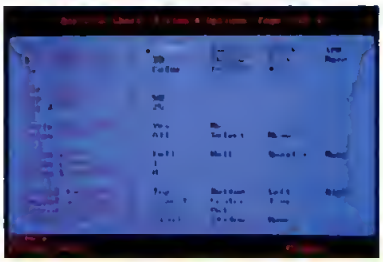
Take a look at the slide on the left. Does it look like it could be created by a graphics amateur? In 10 minutes? With a $195 graphics package? Thousands of Pixie users are making this very image: it's Lesson 3 (just six pages) in the Pixie manual!

Pixie is Zenographics' newest winner. It connects beautifully with our flagship product **Mirage** – the PC-based tool of choice for graphics professionals. Through Mirage, Pixie gains access to the best and most complete output device drivers, and to the artistic expertise of thousands of Mirage power-users worldwide.

	Pixie	Harvard Graphics	Freelance Plus
Graphical user interface?	Yes (MS Windows)	No	No
User interface technique	Direct manipulation	Fill-in forms	Fill-in forms
Editing preserved if chart changes?	Yes	No	No
Screen Fonts	Windows, Bitstream, Mirage	Helv, 1 hardware font	Stick
Maximum colors per image	16 million (Windows limit)	16	12
Compatible with professional systems?	Yes (Mirage)	No	No
Price	$195	$495	$495



Our form



Their form

Pixie

WINNER 1988

For dealer locations or product information, call
(800) FON-PIXIE
(800) 366-7494

For credit card orders, call
(800) 222-9409

Zenographics

CIRCLE 325 ON READER SERVICE CARD

19752 MacArthur Blvd. • Irvine, California 92715 • (714) 851-6352 • TLX 883006 (ZENO UD)

"The Breakthru 286 performed flawlessly with every application we handed it, including copy-protected programs and nine memory-resident utilities at once."
Stephen Manes, PC Magazine

"...the Breakthru 286 was the card of choice."
PC BusinesSoftwareview (Rated #1)

"...Breakthru 286 is a good value and a quality product backed by effective support."
Dan A. Griffin
The Newsletter of the AutoCAD User's Group

"The PCSG Breakthru 286 achieved the best performance results of the caching boards tested."
Ted Mirecki, PC Tech Journal (Rated #1)

"The 12-MHz Breakthru 286-12 speedup board is the fastest of those tested, but not the most expensive. On a dollar per-horsepower basis, it could be called the cheapest boost available for an XT."
Mark Welch, InfoWorld (Rated #1)

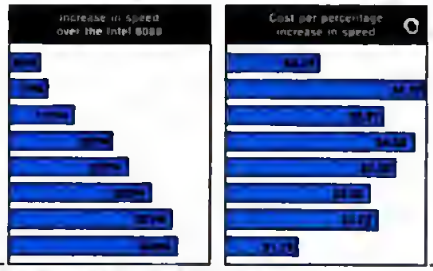
Think You Need an AT?

Make Your IBM PC Faster Than an AT in Just 5 Minutes!

Accelerator Cards: Speed and Value

Speed figures are consolidated results from 10 tests of CPU performance (See Accelerator Boards Special Report, December 1, 1986.)

☐ Microspeed Fast 88	$149
☐ Microsoft Mach 10	$395
☐ Univation Dream Board	$512
☐ Orchid Turbo EGA	$945
☐ ST&D Standard 286	$995
☐ Classic Speedpack	$995
☐ Orchid PC-Turbo 286e	$1,195
☐ **Breakthru 286-12**	$595



REPRINTED FROM INFOWORLD, APRIL 27, 1987

Breakthru 286-8MHz-$395
Breakthru 286-12MHz-$595

LIGHTNING™—FREE with Breakthru speedup hardware—$89.95 purchased separately

We are excited about our three speedup products. You probably know about our Lightning disk access speedup software that was awarded PC Magazine's Best of 1986 award (see box). After the smashing success of Lightning, in late '86, we guaranteed the Breakthru 286 board to be literally the most advanced, fastest, most feature-rich board available. The runaway success it has enjoyed truly proved that assertion. Now we go ourselves one better with the Breakthru 286-12. This new board has the clock speed cranked up from 8 to 12 MHz for speeds up to 10.2 times faster than an IBM PC. It is 50% faster than an 8MHz IBM AT, and up to a whopping 1,000% faster than a regular PC.

HERE'S WHY THESE TWO BOARDS ARE SO SPECIAL.

First, they install so easily. A half-slot card means you don't even have to give up a full slot. What's more, unlike competing products it works in the Compaq Portable and most clones. Easy diagrams show how you just place the card in an open slot, remove the original processor and connect a single cable. There is no software required. From that moment you are running faster than an AT.

Second, they are advanced. The BREAKTHRU 286 replaces the CPU of the PC or XT with an 80286 microprocessor that is faster than the one found in the AT. Has a 80287 math coprocessor slot for numeric intensive applications. A 16K cache memory provides zero-wait-access to the most recently used code and data. Speed switching software allows you to drop back to a lower speed on the fly for timing sensitive applications.

Third, you have full compatibility. All existing system RAM, hardware, and peripheral cards can be used without software modification. Our boards operate with LAN and mainframe communication products and conform to the Expanded Memory Specification (EMS). Software compatibility is virtually universal.

Faster and smarter than an AT - PCSG guarantees it.

Fourth, these are the best. There are several other boards on the speedup market. We at PCSG have compared them all, but there simply is no comparison. Many cards offer only a marginal speedup in spite of their claims and others are just poorly engineered.

We are really excited about these products. PCSG makes the unabashed statement that the BREAKTHRU 286 card represents more advanced technology than boards by Orchid, Quadram, P.C. Technologies, Phoenix...we could go on. Breakthru 286 is undisputedly the turbo board with the biggest bang for the buck. And we include FREE the $89.95 acclaimed Lightning software. Call today with your credit card or COD instructions and we will ship your card the very next day.

But, no speedup board cuts disk access time in half

LIGHTNING

software can - $89.95 or FREE w/Breakthru

"Lightning is almost mandatory...." -
Steve Manes, PC Magazine
Best of 86 review

Loads with the DOS - always ready as a background program to accelerate disk access. You do nothing - everything is automatic. Programs that frequently access the disk (hard or floppy) are made instantly up to 2 to 4 times faster. Uses a principle greatly enhanced from mainframe technology called caching. Fully exploits Above Board memory.

LIGHTNING is the standard against which all our competition measures itself because we achieve universal compatibility with other software. Data is never lost. Order ***LIGHTNING*** separately or get it free with your Breakthru 286 board.

PC MAGAZINE EDITORS' CHOICE BEST OF 1986

Think Again.

DON'T TAKE OUR WORD FOR IT. USE EITHER BREAKTHRU 286 SPEEDUP BOARD FOR 60 DAYS. IF YOU ARE NOT TOTALLY SATISFIED SIMPLY RETURN IT FOR A FULL REFUND.

PCSG

PERSONAL COMPUTER SUPPORT GROUP

11035 Harry Hines Blvd. • Suite 206 • Dallas, Texas 75229 • **(214) 351-0564**

CIRCLE 489 ON READER SERVICE CARD

Exceptional 3-D Spreadsheet

Lucid 3-D™ is a runaway success

Don't take our word for it. Use Lucid 3-D for 60 days. Return it for a full refund if not completely satisfied. Plus, instead of the $199 list price, an introductory spread-the-word price of $149.

Lucid 3-D is priced to sell at $199, but we want thousands of people using Lucid everyday, all over the world. We invite you to be a part of that group. The reason we are offering Lucid for only $149 on a sixty day return for a full refund, is simple. Preliminary user testing of the product produces the same results over and over. People tell us they would never work without Lucid 3-D again. Even folks continuing to work with 1-2-3.

Memory Resident

That's because the idea of a memory resident spreadsheet makes sense, one that you can pop-up instantly while working in your word processor or any other program. Lucid lets you cut anything on the screen and paste it right into Lucid, or cut anything from a Lucid worksheet and paste into the application below. You can even run Lucid on top of 1-2-3 if you like, and cut and paste information from one to the other, including formulas.

Lucid 3-D was developed over the past two years with countless, exhaustive hours of planning and programming to produce something spectacular. This is a product that works the way we dreamed a spreadsheet would function. Everyone who has seen it says things like, "*Lucid 3-D is how software of the 1990's will look and perform*", or even more to the point "*This is the way I thought a computer should work*". You'll see, Lucid is exciting.

FIG. 2 Here we are, instantly. Notice the lower left corner showing we are on level 2. You can go down or up. (See next page)

FIG. 1 Let's get the detail on those ad costs. Just move the widebar to that cell and press one key (grey +).

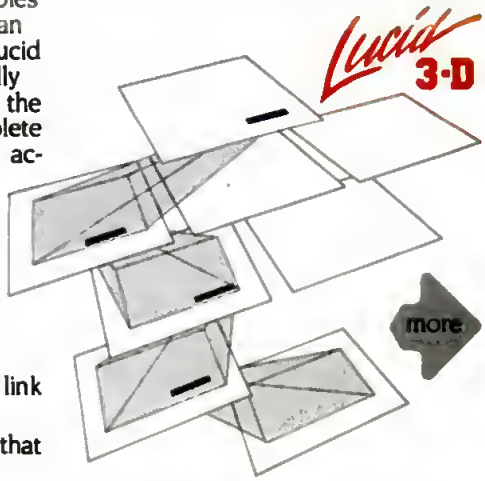
Lucid 3-D was developed over the past two years with countless, exhaustive hours of planning and programming to produce something spectacular. This is a product that works the way we dreamed a spreadsheet would function. Everyone who has seen it says things like, "*Lucid 3-D is how software of the 1990's will look and perform*", or even more to the point "*This is the way I thought a computer should work*". You'll see, Lucid is exciting.

What Makes it so Special

In the screen examples you can see Lucid is really multi-dimensional. Any cell of the spreadsheet can contain a complete other spreadsheet that you can access with a single keystroke. It is as simple as the pictures show. And you don't have to write formulas to do that. All you do is go look at the other file, navigating through easy, point and shoot directories. When you come back up (with one key) the link is made automatically for you.

Everything about Lucid works that way. Users say "*It is so intuitive that I really don't need a manual.*" That's because we use something we call a visual command menu. Jim Seymour, the noted PC columnist, talking about Lucid in a recent article said that, "*If there ever was an interface idea so good it ought to be stolen and widely used, this is it.*"

What he was talking about is a new menu approach that follows a simple design concept: it is easier to recognize than it is to remember. As choices are made on a menu that take you to lower levels you always can see exactly where you came from and where you are going. The complete menu path is always visible. You cannot get lost several levels down. This means you never have to remember a command, you just flow right to it.



1-800-544-4699

Any cell can contain a complete other spreadsheet that you can access with a single key.

Plus, no matter where you are on a menu or what you are doing, just press function key F1, and you will get a help screen specific to that command or action. Or if you want to know about any subject you can pop up an index of over 400 topics and select the one you want.

Notepad Behind Every Cell

Another 3-D feature is that any cell can also contain a multiple page note that you instantly access with a single keystroke. You can write notes, memos or letters that relate to your work, save them as individual files and even print them separately or with your spreadsheet.

FIG. 3 We want more detail, so let's go to Newspapers. Just press the Grey + Key

FIG. 4. Now, instantly we are on level 3. Each level is a different spreadsheet. You could now move to the New York Times and see the detail on that figure. There is no limit to the levels you can go. Move right down to transaction level if you like.

> "The best idea I've seen for a spreadsheet in years."
>
> Jim Seymour, Columnist, PC Magazine, PC Week

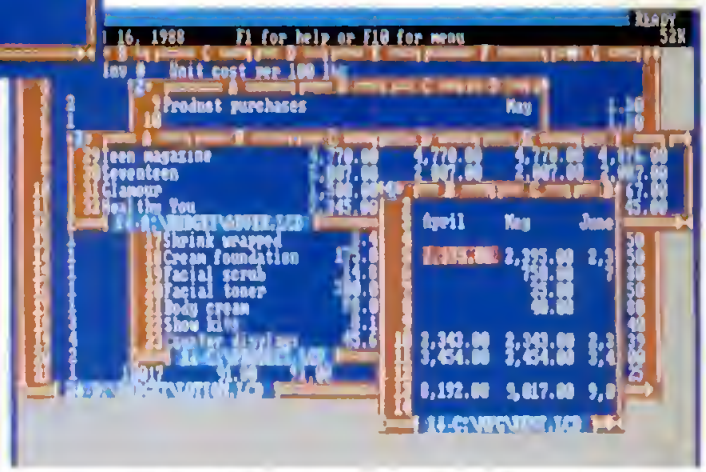


Fig. 5. Of course, Lucid does multiple windows. Notice, you can simultaneously open windows in different directories, different drives, even down as many as 3-D levels as you like. No one else can do that.

Speed

Lucid 3-D is truly revolutionary. It is fast, fast, fast! It is incredibly quick in performing calculations because it doesn't recalculate every cell every time you insert an entry. Instead, it only recalculates the specific cells that are affected by your change. This is called minimal recalc. Lucid also has a remarkable innovation called background recalc in which you are given control of the cursor the moment calculations affecting your viewing screen are completed. Other calculations you don't see continue on in the background during the next commands. The end result of this powerful combination is you rarely wait for a recalculation with Lucid. You find out what instantaneous is all about.

Lucid Learns

Lucid 3-D also lets you teach it any combinations of keystrokes so that involved sequences can be done with single keys. Plus more than just remembering keystrokes, Lucid allows you to create Macros with loops, procedures and conditional branching amazingly all done automatically with simple menus. You can create your own menus that show the new features you have taught it. Another great feature is you can make your custom menus work like Lucid where one choice can take you down a level to a whole new set of choices. What's nice is that they will work from one spreadsheet to another.

Mouseability

Lucid 3-D was designed for both keyboard enthusiasts and mouse lovers alike. You can take your pick. Designed around the mouse from the ground up, the interface is smooth and natural. You select files to load from directory lists. Everything is point and click. What's more, any Lucid 3-D menu selection can be "moused" and the response time is "right now" instead of the sluggish "a little bit behind you" feel of add-on mouse menu systems like those you've seen with 1-2-3.

©COPYRIGHT 1987 PERSONAL COMPUTER SUPPORT GROUP INC.

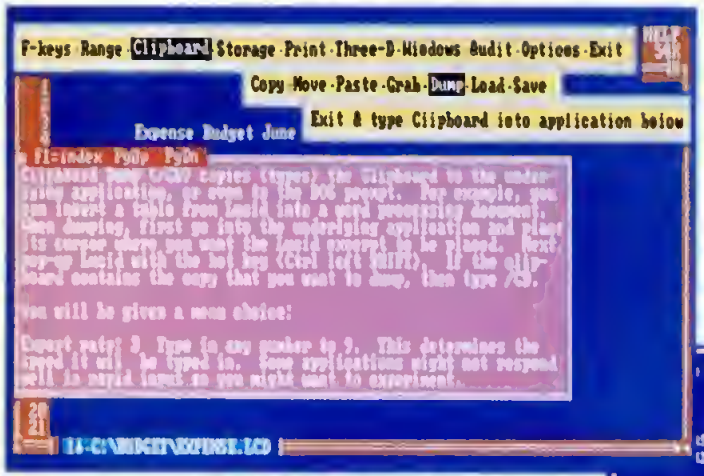


FIG. 6 We need those budget figures in the Word Perfect letter we are writing. Clipboard Dump does it right now.

A window pops up with a library of function names you can page through with the mouse. Select, click and it's in the formula with no typing required. You even have a label window that you can fill (from the keyboard) with favorite labels and names so that you can insert them later with the mouse. There's even a pop-up calculator to insert numbers so you don't have to go to the keyboard very often.

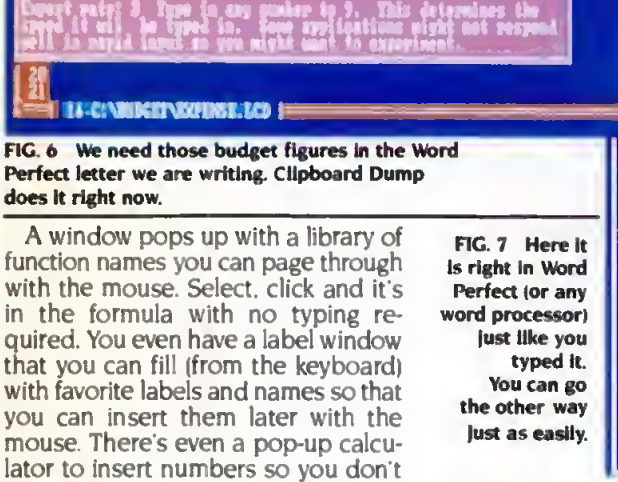
It really permits that feeling of becoming one with your work. Lucid 3-D has windows of user defined range names as well as the macros named by the user that can be selected just by pointing and clicking. Icons that are easy to grab with the mouse let you resize and move the spreadsheet window with the ease you would expect. Plus you can go anywhere on the sheet by moving the mouse and clicking on the spreadsheet borders. And remember Lucid is designed so that any of those features are done with or without the mouse easily and quickly.

Audit

When you are staking a big decision on information gained from a spreadsheet you need to be certain that you have made no mistakes. Lucid offers five audit displays and printouts.

Masterwork

We could go on at great length about all the features and innovations in Lucid, but Lucid is more than a bag of features. What is most important is the pride and craftsmanship that went into its creation. It is a master-


: to: Robert Smith

Enclosed are my estimates for the June 1988 Budget. Please take a look at them, and see if they agree with your views.

Expense Budget June 1988

Advertising	470,305
Administration	294,547
Operations	365,432
Manufacturing	174,002
Research	842,681
Total	1,994,987

Get back to me as soon as possible.

Thanks,

James Johnson

C:\BUDGET\JOHNSON.WP Doc 1 Pg 1 Ln 1 Pos 5

FIG. 7 Here it is right in Word Perfect (or any word processor) just like you typed it. You can go the other way just as easily.

work. The overall feel is tight and polished. In fact, Paul Somerson, executive editor of PC *Magazine*, used one word to describe it, "*Slick*".

PCSG has built a reputation as a development laboratory producing products that you know are excellent. In 1983 PCSG dominated the Model 100 laptop market with ROM based software that every reviewer rated as excellent. In 1985 we produced ***LIGHTNING*** the pioneer and award winning Disk speed up software. In 1986 we developed the ***BREAKthru 286*** accelerator board that blew everything else out of the water, and later we topped ourselves with the Breakthru 12. Now in 1987 those who have worked with Lucid 3-D tell us "*you have done it again. This is software everyone should have.*"

Even if you don't plan to abandon 1-2-3, Lucid makes sense. Files are converted between them with ease so there's not an interoffice compatibility problem. This means you can have the power and fun of Lucid 3-D without having to upset your present systems.

We are excited about Lucid 3-D. But don't take our word for it, take us up on our 60 day offer. Call us on our order line number and we will ship your order the very next day. This $149 offer will end as soon as our dealer network is fully stocked. But in the mean time we invite you to try Lucid as part of our "spread the news" campaign. Just pick up the phone and call us. We accept all major credit cards or you can order COD.

Exceptional spreadsheet for the IBM PC, PS and Compatibles.

Spread-The-News Offer

$149 Introductory Offer (List $199)

Full Refund within 60 days, if you aren't ecstatic

Co-winner of the 1987 PC Magazine Award for Technical Excellence
The other winner: Microsoft's Excel

Call 1-800-544-4699

Lucid 3-D

Ask your dealer or Call

1-800-544-4699

or

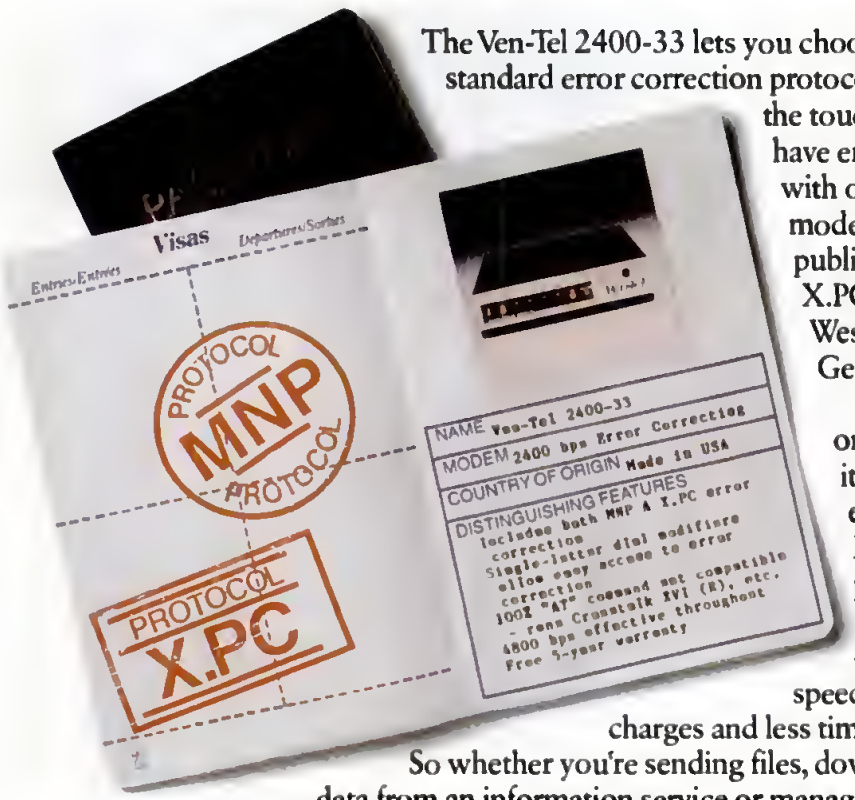
(214) 351-0564

CIRCLE 483 ON READER SERVICE CARD

Makers of ***LIGHTNING***™ disk speed up software, and ***BREAKthru 286*** Accelerator Board.

11035 Harry Hines Blvd.
Building 206
Dallas, TX 75229

The error correcting modem that ensures safe passage for your data– no matter where it's traveling.



The Ven-Tel 2400-33 lets you choose between the two standard error correction protocols (X.PC and MNP) at the touch of a key. So you'll have error free connections with over 350,000 MNP modems *and* with major public data networks using X.PC—like Tymnet, MCI, Western Union and GE Geisco.

And the 2400-33 not only protects your data, it's faster than *any* non-error corrected modem. MNP Level 5 data compression can double your throughput up to 4800 bps—and higher speeds mean reduced phone charges and less time spent transmitting.

So whether you're sending files, downloading expensive data from an information service or managing your personal portfolio, you'll know that your critical data is 100% correct.

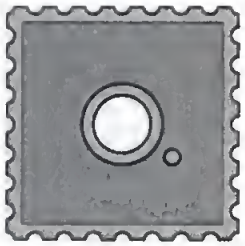
The Ven-Tel 2400-33. The only modem that guarantees your data a flawless trip…no matter where it's traveling.

Ven-Tel
Modems

Our free booklet, "How To Select The Correct Modem," contains specific information about the 2400-33 and our full line of modems. To request your copy, call 800-538-5121.

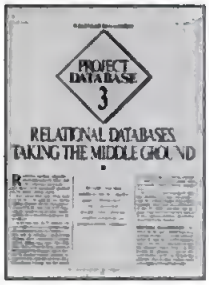
CIRCLE 364 ON READER SERVICE CARD

LETTERS TO PC MAGAZINE



OFF-KEY AND OUT OF TUNE

Your article on relational databases ("Relational Databases: Taking the Middle Ground," *PC Magazine*, April 26, 1988) has left me aghast. Your Editor's Choice, *PowerBase*, gets the nod with *no* sort facility?



Everything we do at the Virginia Living Museum (keeping track of donors, members, and so on) is sorted by ZIP code, last name, or other criteria. I fail to understand how you could have been so unattuned to what most of us do with the files in our databases.

James R. Rollings III
Director of Development
Virginia Living Museum
Newport News, Virginia

Mr. Rollings is apparently unattuned to the risks of sorting. Programs that accomplish sorts by physically swapping records can compromise data integrity if your system goes down during the sort. The more elegant approach to reordering your records—the one that PowerBase *takes—is indexing. Using this feature,* PowerBase *completed the PC Labs sort tests with no trouble at all (see the April 26, 1988, issue, page 174).*—Ed.

NUTS OVER NUTSHELL

Mike Falkner's favorable review of *Nutshell Plus* ("Relational Databases: Taking the Middle Ground," *PC Magazine*, April 26, 1988) nicely summarized the program's features, but the reviewer missed an important point. *Nutshell Plus* places no limits on text field size. For those of us who store, sort, and retrieve lengthy descriptive or historical notes and similar text-laden records, that feature is indispensable. As a satisfied user of the program, I was disappointed you had not pointed out *Nutshell Plus*'s unusual, almost unique talents in this regard.

Marvin Brienes
Woodland, California

UTILITY TO THE RESCUE!

I just want to thank you for the software on your utilities disk. I have put several of these programs to good use. In fact, LPTPORT.COM solved a major problem for me when I could not get one of my programs to print properly.

Although I had a second parallel printer port available on my Intel AboveBoard card, I could not figure out how to address it as LPT1, which is the only port this program can use. LPTPORT to the rescue! I switched my printer cable to the AboveBoard parallel outlet and loaded LPTPORT.COM in the AUTOEXEC.BAT file, and everything worked! Your program saved me many dollars and hours of headaches.

James E. Reid
Haverhill, Massachusetts

SIFTING THROUGH SEXISM

With all the documented evidence concerning the destructive effects of sexist language, it is hard to believe that a publication as evolved as yours still indulges in its use. Yet every month, blended in with your well-researched articles, priceless reviews, and sharp commentary are countless sexist terms and pronouns—almost all of which could be easily rectified.

A new editorial policy in this area could help the finest Independent Guide to IBM-Standard Personal Computing stop contributing to this pervasive form of sexism!

William Detjen
Winooski, Vermont

IBM: ITS OWN WORST ENEMY

I agree 100 percent with Robert L. Hummel's definition in his PC Tutor column on OS/2 (*PC Magazine*, April 12, 1988). The number-one problem that plagues the IBM PC world is—IBM!

Sadly, IBM doesn't see it that way and will likely ignore your suggestions.

Derek Hamilton
Toronto, Ontario
Canada

SPEED LIMITS

I was pleased with the open-mindedness Winn L. Rosch exhibited in his review "IBM's PS/2 Model 80-111: A Dream Deferred," *PC Magazine*, April 26, 1988). It was refreshing to see that speed, power, and speed were not his only considerations. I cannot think of any one computer that is better in every way than another. When *any* two computers are compared head-to-head, there will always be some little area where even a heavy underdog will excel.

Jack E. McCoy
Deep Run, North Carolina

It was with great interest that I read your article "IBM's PS/2 Model 80-111: A Dream Deferred." I wasn't surprised to once again see unfair criticism of IBM for not blazing the trail in speed.

OUTSTANDING SOFTWARE

For IBM PC's and Compatibles

$3.50 PER DISK — Small Quantities

$3.00 PER DISK — For Ten or More

SHIPPED WITHIN 24 HOURS!
Satisfaction Guaranteed or Money Back!

- ☐ **BUSINESS 1**—EZ-FORMS business form generation, completion and printing program.
- ☐ **CAD 3**—The PC-Flow 1.0 computer aided flow-chart generation program. Color graphics required.
- 5 **COMM 4a,b,c,d,e**—(5 disks) Join the world of sysops with RBBS Bulletin Board System 14.1D.
- 2 **DATABASE 1a,b**—(2 disks) File Express 3.8 menu driven general purpose database manager.
- ☐ **EDUCATION 1**—Interactive DOS tutorial for new PC users. Makes learning DOS painless.
- 2 **FINANCE 1a,b**—(2 disks) PC Accountant 2.0 personal bookkeeping and finance management.
- ☐ **GAMES 1**—3-D Pacman, Kong, Spacewar, Janit-Joe, futuristic Flightmare and more. Color required.
- ☐ **GAMES 2**—Qubert, Pango, Centipede, dungeons and dragons style Zoarre, etc. Color req.
- ☐ **GAMES 3**—Blackjack with customizable rules, Armchair Quarterback (you call plays), and more.
- ☐ **GAMES 4**—Star Trek, tha Castle adventure game, and the original Colossal Caves Adventure.
- ☐ **GAMES 5**—The Hack adventure game from the universities. Like Rogue, only much richer.
- ☐ **GAMES 6**—Pinball, Othello, Dragons, Sopwith (fly a Sopwith Camel) and more. Color required.
- 2 **INFO 1a,b**—(2 disks) Cooking recipes database with keyword/ingredient retrieval. Add your own.
- 2 **MUSIC 2a,b**—(2 disks) PianoMan 3.0 polyphonic music recording and playback program.
- ☐ **ORGANIZER 1**—DeskTeam, a Sidekick clone, and the Judy personal calendar program.
- ☐ **PRINTER 1**—Resident print control and font utility, intelligent spooler, banner maker, and more.
- ☐ **SIMULATION 1**—Maze making program, MIT's Life simulation, starfields, etc. Color graphics req.
- ☐ **UTILITIES 1**—A collection of invaluable general purpose DOS utilities. An absolute must for all.
- ☐ **UTILITIES 2**—More invaluable DOS utilities including screen burnout, ram disk, and more.
- ☐ **UTILITIES 3**—A comprehensive set of debugging and diagnostic utilities for monitoring your computer.

PC 7/88

NEW RELEASES/UPDATES

- ☐ **BUSINESS 2**—Expressgraph business graphics. Chart your data and find trends. Color graphics req.
- 2 **CAD 1a,b**—(2 disks) Fingerpaint 1.2 advanced painting and Altamira object oriented design. Color.
- 2 **CAD 2a,b**—(2 disks) DenCad3d, an advanced 2D/3D drafting program w/animation. 640K, color.
- 2 **COMM 2a,b**—(2 disks) Procomm 2.42, an excellent modem program with terminal emulation.
- ☐ **EDUCATION 3**—PC-Fastype 1.20 typing tutor, ideal for beginners and advanced students alike.
- 2 **FINANCES 3a,b**—(2 disks) Express Calc 3.12, a powerful and user friendly spreadsheet program.
- ☐ **GAMES 8**—Striker helicopter attack and Risk, the game of world domination. Color required.
- ☐ **GAMES 12**—Backgammon (play the computer) and Wheel of Fortune based on the gameshow.
- ☐ **GRAPHICS 1**—Record and play back screen images! Excellent for demo, etc. Color required.
- 3 **GRAPHICS 2a,b,c**—(3 disks) An excellent 3-D surface modelling and shading program. Color.
- 2 **INFO 2a,b**—(2 disks) Zip-Phone, national areacode/prefix to zip-code cross reference.
- 2 **LANGUAGE 3a,b**—(2 disks) The A86 3.09 macro assembler and debugger for 8088/86/286s.
- 2 **SHELL 4a,b**—(2 disks) Automenu and HDM II 4.04 hard disk prog. for custom full-screen menus.
- ☐ **UTILITIES 5**—Hard disk utilities for verifying, formatting, parking and optimizing your disk drives.
- ☐ **UTILITIES 6**—Advanced utilities including Mark/Release (remove resident progs w/o reboot!)
- ☐ **UTILITIES 7**—More advanced utilities including Masterkey (undelates files from hard disks).
- 2 **WORD 1a,b**—(2 disks) PC Write 2.71, a powerful word processing system w/spell checker, laser supt.

Most software listed is shareware or user-supported

3.5" format add $1 disk. 125 pg file directory add $2

MicroCom Systems
3673 Enochs Street
Santa Clara, CA
95051

Cost of items _____
Shipping $3.00
CA res tax _____
Total encl. _____

VISA (408) 737-9000 MasterCard

Mon-Fri 7am-9pm Sat Sun 8am-5pm

CIRCLE 302 ON READER SERVICE CARD

■ LETTERS

IBM has never tried to "push the envelope" of computing power by running processors at speeds greater than they were designed for, or by using hard disks with access times faster than drives that had 2 to 3 years of reliability data under their belt, or by implementing major changes that enhanced speed while jeopardizing future compatibility.

I have to wonder what you're going to tell your readers if future developments should prove IBM's decision to be ingenious. The majority will have purchased Compaq 386 computers for their downward compatibility instead of the IBM 386 for its future potential.

James B. Stack
Whitefish, Montana

DEAD LOBSTER REINCARNATION

In Bill Machrone's column "Tough Times at the Market" (*PC Magazine*, April 26, 1988), he wonders, "What do you do with those dead lobsters at the bottom of the tank, the 8088-based machines?"

A possible solution would be to donate those "lobsters" to a charitable organization. I'm sure that either the organization itself or the people it supports could use a spare computer or two (even if it is quasi-obsolete).

Or you could try giving the computers to community schools. Of course, the donation should be tax deductible. In any case, it's a win-win solution.

David A. Lessnau
Fairfax, Virginia

A SIMPLE CHOICE

It was great to see *Q-Pro 4* get a fair review by someone who recognized it for what it is: a powerful programmers' programming language ("Programmable Databases: dBASE and Its Challengers," *PC Magazine*, May 17, 1988).

However, it seems unfair to compare *Q-Pro 4* with *dBASE III* or *R:base*, because like COBOL, BASIC, and C, *Q-Pro 4* is a programmers' language. Q-N-E International used to be known as Quick and Easy, and *Q-Pro 4* users referred to the language as Quick and Easy. Why anyone would want to write and develop in C when they can work in *Q-Pro 4*, translate the programs directly into C, and then compile them is inconceivable. Next time you review programming languages, try stacking them up against *Q-Pro 4* coupled with QE and Q2C, and think about which offers software developers the real choices.

Thomas T. Keating
President
Solutions Software
Cherry Hill, New Jersey

VIDEO VENGEANCE

The What's Inside column in the April 26, 1988, issue told of the heroic efforts of your author Mike Falkner, who used his camcorder to capture a momentous screen event on *film*. I would like to point out to you that camcorders, like all video cameras, record their images on *videotape*. Anyone who has ever tried loading his film into a camcorder could probably explain this to you.

Oh well, maybe some video magazine has a Communiqués column I can send that article to.

J. C. Turner
Cedar Falls, Iowa

THE TORTOISE AND THE HARE

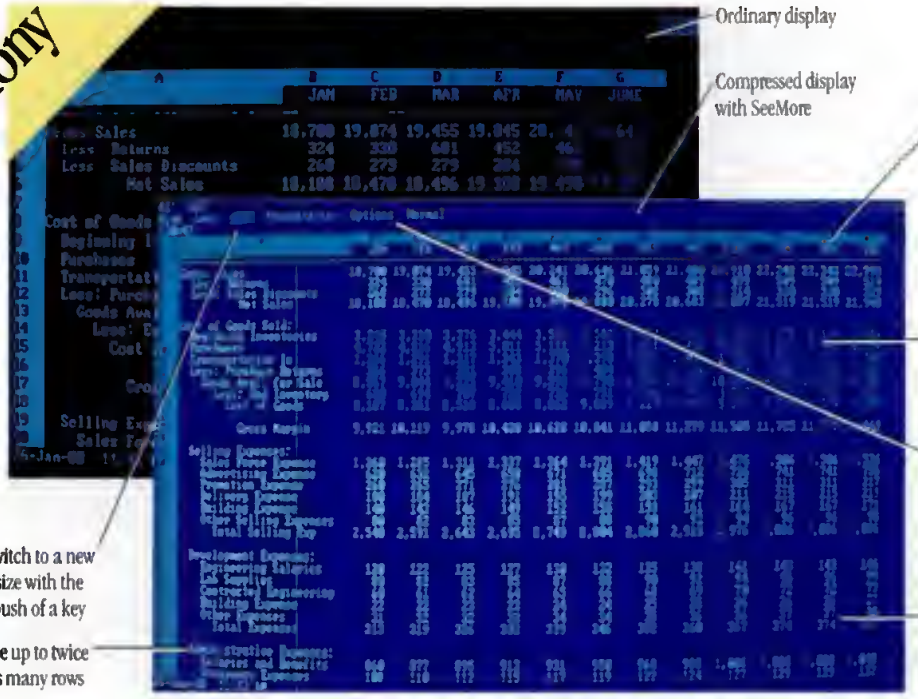
As Jim Seymour alluded in the sidebar "The Quest for the Least Computer" ("Planes, Trains, and Automobiles: 12 Portables for the Road," *PC Magazine*, March 29, 1988), the Toshiba T1000 may be a little slower than some, but it offers mouth-watering practicality and functionality, especially when combined with *Framework II* in hard RAM. I have found the resultant 6½ pounds of computing power simply and truly unbeatable! And I've been looking for a long time . . . .

Lt. Col. K. D. Bremer
Austin, Texas

TURBO TURMOIL

Your review of 386 turbo boards ("The Transformers: 386-based Turbo Boards for XTs," *PC Magazine*, April 12, 1988) was more a compilation of observed features than a thoughtful and comparative analysis of performance from a user's

For 1-2-3 and Symphony



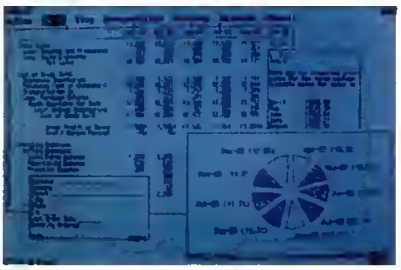
THE BEST OF 1987 PC MAGAZINE

Unretouched photo of EGA display.

See More Rows and Columns

Now you can zoom out to see more on the screen – without exiting your worksheet and without investing in special hardware!

With SeeMORE™, a remarkable add-in program for 1-2-3® and Symphony®, you can instantly double, triple or quadruple your view with the push of a key.



Pack more into every Symphony window.

SeeMORE lets you build a twelve month forecast without stopping to scroll left and right. All twelve months appear on the screen. SeeMORE gives you the big picture.

SeeMORE manages the screen without interfering with the normal operation of 1-2-3 or Symphony. You can zoom in and out as you build and manipulate a worksheet. You don't need to exit and switch to a new driver set!

Works with 1-2-3 Rel 2 and 2.01 or Symphony Rel 1.1, 1.2 and 2.0 on the IBM PC, XT, AT, PS/2 and compatibles. All you need is a simple graphics adapter: CGA, EGA, VGA, MCGA or Hercules. Also looks great on Compaq and Toshiba gas plasma. Not copy protected. 1-2-3 version $79.95. Symphony version $99.95. Get SeeMORE and expand your horizons.

Compaq® Portable III plasma display.

	CGA	EGA	VGA	Herc	Plasma
Normal	80x25	80x25	80x25	80x25	80x25
Medium	91x28	106x43	91x37	90x43	106x40
Small	106x33	128x43	106x48	120x43	128x50
Very Small	128x25	150x51	128x53	144x43	N/A
Tiny	128x33	160x58	160x60	180x58	160x66
Presentation	40x25	40x25	40x34	45x25	40x28

Available from Egghead Software, Corporate Software and other fine resellers. Distributed through Ingram, Kenfil, Micro D, Softsel and Software Resource.

"SeeMORE is brimming with innovations."
– Lotus Magazine

"I use SeeMORE almost constantly."
– Jim Seymour, PC Magazine

"Recommended."
– InfoWorld

See our ad on page 406.

SeeMORE™ PC 7/88

Please send me: (indicate quantity)

_____ SeeMORE 1-2-3. $79.95 each.

_____ SeeMORE Symphony $99.95 each.

Include $3.75 for shipping. ($12 outside USA and Canada.) MA residents add 5% sales tax.

Payment: ☐ VISA ☐ MC ☐ AMEX ☐ Diners ☐ Check

CARD NO

EXP DATE PHONE

NAME

ADDRESS

CITY STATE ZIP

To order, mail coupon or call toll-free:
In MA: 800-447-1196, Nationally:

800-445-3311 x1107

Personics Corporation
2352 Main Street
Concord, MA 01742
617-897-1575

Where We Stand On Accounting.

Eight years into it and firmly planted.

With our experience and knowledge we have created a new foundation for over 70,000 businesses worldwide.

And now, you might say we wear a bigger pair of shoes. Because we write accounting software that's more than just a tool for accountants. Our Database Accounting Library™ is designed from the ground up to run an *entire* business.

A system that everyone in a business can use, on just about every computer or network. It's written in dBASE®. The most accepted business programming language in the industry. Providing the power and flexibility that enables your information to achieve its maximum potential.

A financial system should grow as your business grows and be able to fit the specific needs of that business. No matter what type of business you're in. The Database Accounting Library includes the source code that allows you to do just that. And we back it up with an unprecedented five-year warranty.

It's all designed to put your company on a much firmer footing.

You see at SBT, we stand for more than accounting.

We stand for better business.

SBT
CORPORATION

800-277-7193. In CA 800-331-8998.

CIRCLE 470 ON READER SERVICE CARD

Every Major Hardware and Software Manufacturer That Offers Remote Support, Uses Close-Up!

Join the Leaders

Software and Hardware manufacturers such as Ashton-Tate, Borland, IBM, and Lotus use Close-Up to provide support to their corporate accounts.

For example, our agreement with IBM covers over 100,000 copies of Close-Up to be used by their Support Centers. Close-Up lets IBM support personnel use a PC to dial a customer's PC which can be connected to their mini or mainframe. Once connected, screens and keyboards are linked as one. The customer and IBM can diagnose problems in a "real-time" environment. Instantly, and without travelling.

MIS managers in Fortune 500 corporations like Merrill Lynch use Close-Up to support the entire company from one location. Kwik Kopy and PIP use Close-Up to support and train franchises. Computerland and Entre' chose Close-Up for its ease-of-use in supporting their customers.

Close-Up lets you work with your customers, access their DOS, run their programs and work on their files, all remotely!

Close-Up does More . . . Remote Order Entry

Novell's entire North American order entry system is based on Close-Up. Their netware centers and regional offices call into any one of the central office's 45 workstations running Close-Up. The remote offices become part of Novell's order entry network as though they were actually there. They have file server access at full network speeds, 24-hours a day. And using Close-Up's remote print feature, reports are printed remotely at the regional sites.

Point of Sale

Softsel, the largest worldwide software distributor, uses Close-Up exclusively in their new Dial-Up SalesNet order entry/inventory sytem. Close-Up's error corrected keystrokes and screens ensure that orders are entered accurately. Dealers throughout the country check current inventory levels, review product/price descriptions and enter orders, all remotely!

Close-Up Lets Your Computer Do Two Things at Once

With Close-Up you connect and exchange information PC to PC, or PC to mainframe. Close-Up automatically dials, redials and logs on to information services such as Dow Jones, CompuServe, The Source, and Lexis. Or sends and retrieves telexes. And even picks up your electronic mail from services like MCI or Telenet's Telemail.

And if that's not enough, Close-Up will do all of that in the background, while you continue working on your word processor, spreadsheet or applications program in the foreground.

Close-Up Works at Night, So You Don't Have To!

Close-Up automates your routine jobs. Any time, day or night. This includes sending and fetching files. Entering keystrokes into a remote computer. As well as running and interacting with programs remotely. All this, without anyone being at either end.

Imagine you have 25 offices around the country. At night, from the home office, Close-Up will call all 25 remote offices. Fetching the daily inventory or sales information.

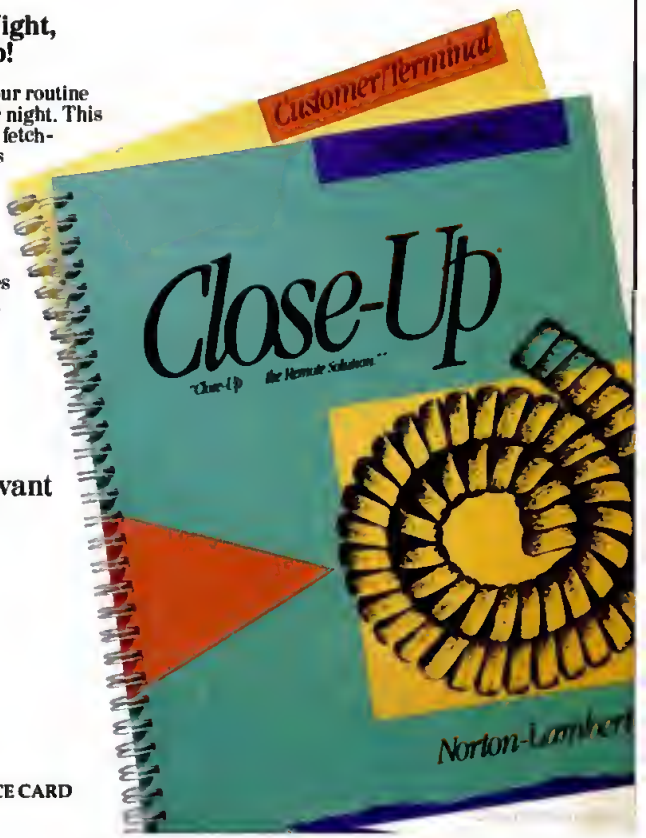
Back at the home office, Close-Up runs the inventory spreadsheet with a macro that consolidates the information.

Then Close-Up sends the consolidated inventory to all 25 offices. Even printing it out at the remote locations, so the office managers have consolidated reports on their desks when they arrive in the morning.

And, of course, Close-Up keeps a detailed log of all it accomplished while you slept!

Close-Up: The complete communications system chosen by the leaders:

- Remote Support.
- Remote Order Entry.
- Home to Office Communications.
- PC to PC Communications.
- PC to Mini or Mainframe.
- PC to Information, Telex, & Electronic Mail Services.
- Automated Communications.
- Gateway to LANs



Close-Up
THE REMOTE PROGRAM CHOSEN BY IBM

Close-Up meets all your communications needs. When you want communications, say Close-Up.

Call now! 805/964-6767

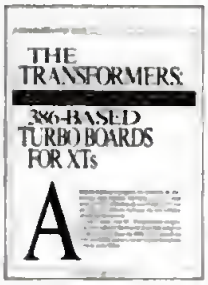
Norton-Lambert Corp., Post Office Box 4085, Santa Barbara, CA 93140 USA 805-964-6767 Telex: 709170

Copyright © Norton-Lambert Corp. 1988. For IBM PC/XT/AT, PS/2 and Compatibles.

CIRCLE 217 ON READER SERVICE CARD

■ LETTERS

point of view. Winn L. Rosch seemed unaware of (or uninterested in) the accompanying benchmark-test comparisons, leaving me somewhat confused about the exact meaning of the results.



The benchmark tests compared the three PC turbo boards with an IBM PC AT rather than with a PC-XT, which was the computer being upgraded. The benchmark tests and discussion also overlooked the existence of high-speed 286 turbo boards, which might have favorable ratios of cost per additional megahertz of speed (and which also run OS/2 now).

The statement that the Inboard 386/PC is limited to "about 80 percent of the calculating throughput" of the 16-MHz Compaq is confusing. Does this mean an effective rating of 12.5 MHz?

The rather important issue of EMS support was only briefly mentioned because of a quirk in the Quad386XT. Lastly, the fact files and review were not sufficiently specific regarding the potentially expensive details such as how much memory is supplied, whether unpopulated boards are available, and the cost of additional cables or any of the other accessories that may be needed.

Al Field
San Diego, California

Actually, features, not performance, distinguish 80386 turbo boards from 80286 products in unenhanced computers. As noted in the story, the additional operating modes and improved memory handling of the 80386 make it the best choice for multitasking.

Throughput and not megahertz is the major issue with the turbos because they are limited in I/O performance by the slow PC bus. Benchmark-test numbers alone will not reveal this shortcoming, a point addressed in the story proper.
—Winn L. Rosch

In Winn L. Rosch's article "The Transformers: 386-based Turbo Boards for XTs," he states that "the Inboard is incompatible with early model PCs with 64K system board RAM."

I own an Intel Inboard 386/PC, and it is functioning properly in my IBM 64K PC. What may have been overlooked is that the successful installation of the Inboard in the older PCs may require the upgraded ROM BIOS that was offered by IBM several years ago.

Overall, I am impressed with how well the Inboard 386 works and how easily it was installed in my PC.

Peter M. Hayes
Durham, Connecticut

Mr. Hayes is correct that the 80386 turbos may work in early PCs, providing that the computers have been upgraded with a new BIOS ROM. Because the upgrade ROM is no longer available from IBM, the turbo manufacturers themselves classify their products as incompatible with early PCs. In other words, when these products are combined, bugs and other problems may appear for which the manufacturer assumes no responsibility.—Winn L. Rosch

CORRECTIONS/AMPLIFICATIONS

God Speed (After Hours, *PC Muguzine*, March 29, 1988) is distributed by Paraclete Software, 1000 E. 14th St., #425, Plano, TX 75074. We incorrectly stated that it was distributed by Kingdom Age Software.

Archive-Link and *VsCom* (PC Advisor, *PC Muguzine*, February 29, 1988) are developed, produced, and marketed by M/H Group, 222 W. Adams St., Chicago, IL 60606, not by General Information Systems, as we reported.

In our review of *Congressional Toolkit* from BJ Toolkit (After Hours, *PC Magazine*, May 31, 1988), we incorrectly reported the company's telephone number. The correct number is (914) 271-8271.

HOW TO WRITE TO PC MAGAZINE

Send your letters to *PC Muguzine*, One Park Avenue, New York, NY 10016, or through PC MagNet (see page 4 for access information). All letters become the property of *PC Muguzine* and are subject to editing.

iISYS
ACCOUNTING SOFTWARE

Resellers, Consultants, VARS:

Imagine being able to offer one business management software system ideal for every client. A system so flexible and powerful that it allows your clients the opportunity to design their system the way they currently do business. A system so simple for them to use that you will be freed from those never ending support calls. A completely integrated system and all for under $1000*. If only there was such a system. There is. We call is ISYS.

Become a member of the ISYS Dealer network and begin receiving increased business, special pricing, solution-oriented support, innovative marketing, and more. Don't miss out oo this opportunity, give us a call today! *Single user

MODULES AND FEATURES:

GENERAL LEDGER
- Multi-company/multi-level accounts
- 255 user defined financial reports

ACCOUNTS RECEIVABLE
- Unlimited # of customers
- Open invoice and/or invoice balance fwd
- Unapplied pmts/multi-company A/R
- Multiple profit centers
- Credit limits, collection status and payment discounts
- Supports partial payments and finance charges

ORDER ENTRY
- Produces shipping labels for invoices
- Service and product-oriented businesses non-inv codes handles shipping and labor taxable/non-taxable items on same invoice
- Multiple User-defined sales tax tables
- Prints packing slips & sales journals
- Customized text on user-designed invoices

INVENTORY
- LIFO, FIFO, weighted average, and standard cost supported
- Allows up to 4 places for units, cost, and price

ACCOUNTS PAYABLE
- Unlimited # of accounts
- Post to 200 G/L expense accts per invoice
- Automatically updates Inv & G/L
- Supports pre-paid expenses & future liabilities

PAYROLL
- Automatically posts to G/L, &/or A/P
- Benefits and deductions are calculated on fixed amounts, hourly amounts, percentage of gross, or variable amounts
- Allows additions to gross: taxable, non-taxable, or partially taxed — 401k plan
- Handles sick leave & vacations
- Tax tables easily updated by user

ACCOUNT NET (Multi-User)
- Upgrades system to network environment
- Network supported: Novell, 3Com, 10Net, LaoLink, and others supporting NetBios

LINCS (DATA INTERFACE)
- Allows transfer of data from the accounting system to an ASCII file which can then be imported by other software such as spreadsheets or database systems. This module can also import data into the accounting system from ASCII files generated by any other software system.

CURRENT VERSIONS:
- English, Spanish

SYSTEM FEATURES:
Cannot post out of balance, 15 periods/fiscal year, post to any period at any time. Impossible to double-post even if interruped. All modules run either stand-alone or integrated. 15 alpha-numeric characters for G/L accounts, vendors, customers, stock & employees.

CALL: 1-800-255-4048
or APSA (Mexico) 589-7753

INTEGRATED INFORMATION SYSTEMS
9800 East Grand River.
Brighton, MI 48116 (313) 229-1808

CIRCLE 200 ON READER SERVICE CARD

Guaranteed Compatibility

Shop PC Brand quality. Save time. Save trouble. Save money.

Have it your way...PC Brand delivers what you *really* want. Superior quality. Exceptional savings. Custom configurations built to your exact specifications. Responsive toll-free service and support. Free freight. The best 5-Year Warranty in the business. And a Money-Back Guarantee on every system we sell. Get more for *your* dollar. Call 1-800-PC-BRAND today. You'll even get a FREE GIFT...see our Free Mouse Offer next page.

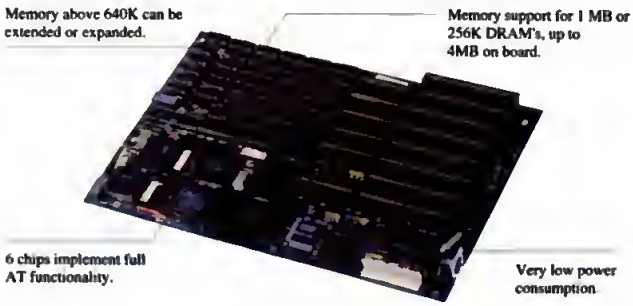
PC AT-286/12 $949

12 MHz, Zero Wait State, SI 15.3 LANDMARK™ Speed 16 MHz.

512K, 1.2MB Drive w/combo Controller, 101-keyboard:

- 512K RAM Standard. Accommodates up to 4MB of RAM on Motherboard using 100NS, 1MB DRAM's
- 1.2 MB Floppy Drive.
- Combination Hard Drive/Floppy Controller
- 180 Watt Power Supply.
- Enhanced 101-Key AT-Style Keyboard
- OS/2® compatible today
- 100% IBM, MS/DOS, OS/2, XENIX, Novell, 3COM, and PCNET LAN compatible
- Memory above 640K can be configured either EMS/ Expanded, or Extended, by motherboard switch setting
- 8 Slots (six are 16 bit). Clock/Calendar on board.
- AT-Style Case with Keylock, Turbo, Power and Hard Drive LEDs. Small footprint case can accommodate up to four half-height mass storage devices.

MONO - System above with 12" Mono Monitor & Hercules compatible Graphics Card with Printer Port **$1059**
EGA - Base configuration with EGA card and Enhanced Graphics Display **$1384**



YOU GET THE MOST ADVANCED 286 MOTHERBOARD EVER DESIGNED

Your advanced PC AT-286 /12 Motherboard uses just 6 VLSI chips to replace the functionality of over 120 chips. First 286 designed from scratch for stable and reliable 12 MHz performance.

PC V20 AD-II $575

15 MHz, in an XT machine. Complete with Monographics Card & Monitor.

512K, One Drive, Mono Card & Monitor, 84 keyboard:

- 512K RAM Standard. NEC V-20 CPU
- One 360K Floppy Drive
- 84-Key AT-Style keyboard
- 4-layer Motherboard expandable to 1 MB
- 8 Slots. Built-in Serial, Parallel, Game Ports, Clock
- Hercules Compatible Graphics Card
- 12" Monochrome Monitor
- Accommodates up to 4 HH Mass Storage devices
- AT-Style Case with Keylock, Turbo, Power and Hard Drive LEDs. Photo-Illustrated Set-Up & Operating Instructions.

HARD DRIVE - Seagate ST225 20 MB Drive & Controller ... **$269**
HARD DRIVE - Seagate ST238 30 MB Drive & Controller **295**
MS/DOS, GW Basic **55**

Color and EGA Models available...please call.

ADD A HARD DRIVE:

Enhance any 286 or 386 system with a hard drive:

- ❑ **40 MB 40MS Seagate ST251 HH** **$393**
- ❑ **40 MB 28MS Seagate ST251 HH** **$469**
- ❑ **80 MB 28MS Seagate ST4096 FH** **$742**
- ❑ **110 MB 28MS RLL Miniscribe 6128** **$989**

We offer a full line of standard drives from Maxtor, Microscience, Priam, Miniscribe, and ESDI Drives & Controllers. Please call.

CIRCLE 310 ON READER SERVICE CARD

Risk-Free 5-Year Warranty

INTEL-SBC386/16 $1749

16 MHz, genuine Intel-manufactured system...the max in 386 performance.

512K, 1.2MB Drive w/ combo Controller, 101-keyboard:

- 512K RAM Standard. Certified 32 Bit 386 CPU.
- Expandable to 16 MB of 32 Bit Memory
- 1.2 MB Floppy Disk Drive
- Combination Hard Drive/Floppy Controller
- 220 Watt Power Supply
- Enhanced 101-Key AT-Style Keyboard
- OS/2 ® compatible today
- 100% IBM, MS/DOS, OS/2, XENIX, Novell, 3COM, and PCNET LAN's compatible
- Socketed for optional 80387 co-processor
- Serial, parallel ports, clock/calendar standard
- Two 32-Bit Slots
- AT-Style Case with Keylock, Turbo, Power, and Hard Drive LEDs. Full size case accomodates up to 5 HH Mass Storage devices.

2 MB 32 Bit Memory Card **$155**

MONO - System above with 12" Mono Monitor & Hercules compatible Graphics Card w/ Printer Port **$1865**

EGA - Advanced Autoswitch EGA and Enhanced Graphics Display **$2185**

The Best Warranty in the Business.

PC Brand customers expect the best...and they get it. You'll enjoy our exclusive 5-Year Warranty on all systems hardware and peripheral cards. Other companies ask you to settle for 1-year. We give you *five* long years of protection...automatically!

A Word to the Wise About Buying PC Clones:

Be careful. *Know* what you're getting before you buy. You'll find ads offering you "base configurations" without RAM. Without drives or controllers. Some without a keyboard for heavensakes! Why? Because they are trying to attract you with *artificially low prices*. Don't be a victim. Be wise and shop with confidence with PC Brand. All PC Brand configurations come to you fully-functional. In top working condition. We burn-in every board for 48 hours. Every system for 72 hrs. We do *not* inflate freight charges and we do *not* charge you credit card surcharges (as others do). We simply treat you right...with honesty, integrity, and service you can depend on. It's worked for our customers. It's worked for us (for over five years now). And we'd be delighted to make it work for you. Call PC Brand today!

We'll Custom Design To Your Specifications. Have particular needs? Call us and we'll customize a system to your specifications. If you're not sure what you need, call us and we'll be glad to help.

SAVE ON HARD DRIVES, MODEMS, MONITORS, VIDEO CARDS,CHIPS, ACCESSORIES AND MORE! SEE NEXT PAGE.

☎ Call 1-800-PC BRAND

(Call 1-800-722-7263...In Illinois, Call 312-226-5200)

PC Brand, Inc. 954 West Washington Street, Chicago, Illinois 60607 1-800-722-7263 Hours: Monday thru Friday 8 a.m. to 6 p.m. Central More Ordering Info on next page. VISA, MasterCard, Personal or Company Checks, and Approved P.O.s Accepted. Prices subject to change.

CIRCLE 311 ON READER SERVICE CARD

PC07801

Toll-Free Service

MONITORS

- NEC Multisync II 14" Enhanced Graphics Color Monitor $589
- NEC Multisync Plus 15" Enhanced Graphics 960 X 720 res.....$897
- NEC Multisync XL 20" Enhanced Graphics 1024 X 768 res.....$1975
- Amdek 12" 410 Series Flat Screen TTL Monochrome ...$149
- Amdek 12" 600T Series Flat Screen RGB Color 350
- Magnavox 12" Amber Mono High Resolution 79
- Magnavox 14" Standard Color 230
- Magnavox 14" Color Enhanced Graphics Display 339
- Mitsubishi 14" Diamondscan .....call
- NEC Multisync GS 14" Monochrome "Grey Scale" 199
- Princeton Ultra-Sync 14" Multi-Mode Enhanced Graphics Color Monitor 520
- Princeton 15" LM 300/LM 301 Desktop Publishing Display (requires special video card) 550

MODEMS

All PC Brand modems are 100% Hayes® and IBM compatible.

- 1200 Baud Internal with free software $55
- 1200 Baud External 75
- 2400 Baud Internal with free software 135
- 2400 Baud External 150
- Hayes 1200 External 279
- Hayes 2400 External 420
- Migent 1200 Pocket Modem with cables & software 60
- U.S. Robotics 9600 HST 660

PRINTERS

- Diconix 150P Ideal for Laptops! $309
- Diconix 300P 15" wide version of above .....call
- NEC P2200 The most popular 24-pin printer 340
- NEC P7 High capacity, high performance 600
- NEC P9XL Top of the line matrix 1030
- NEC LC890 Postscript Page Printers .....call
- Panansonic 1080I Ideal entry level printer 170
- Panansonic 1091IM2 Best selling nine pin! 199
- Panansonic 1592 High performance, wide carriage 415
- Toshiba Printers, Full line .....call!

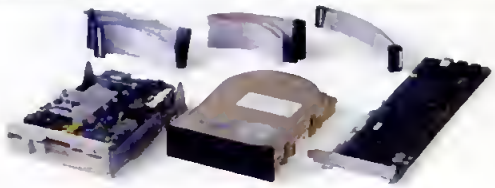
CHIPS & CO-PROCESSORS

Due to current market volatility in RAM chips, we are unable to list our selection and prices in this ad. Call for price and availability.

MATH CO-PROCESSORS:

- INTEL 80287-10 .....Call
- INTEL 80387-16 .....Call
- INTEL 80387-20 .....Call

DISK & TAPE DRIVES



Hard Drives:

- 20 MB 65MS Seagate 225 w/XT controller $269
- 30 MB 65MS Seagate 238 w/XT controller 295
- 40 MB 40MS Seagate 251 393
- 40 MB 20MS Seagate 251-1 469
- 80 MB 28MS Seagate 4096 742
- 110 MB 28MS RLL Miniscribe 6128 989
- 230 MB 25MS RLL Priam 230R2 2200

Hard Drive Cards:

- 20 MB Seagate ST 125 High perform. w/controller 299
- 40 MB Seagate ST 138 High perform. w/controller 380

Call for high performance Miniscribe, Microscience, Maxtor, Priam, as well as ESDI, SCSI, WORM Drives & Controllers.

Floppy Drives:

- 360K 5 1/4" $75
- 720K 3 1/2" w/5 1/4" mounting for XT/AT 80
- 1.2MB 5 1/4" 90
- 1.44MB 3 1/2" w/ 5 1/4" mounting for XT/AT 100

PS/2 Drives:

- CMS 5 1/4" external drive for PS/2 239

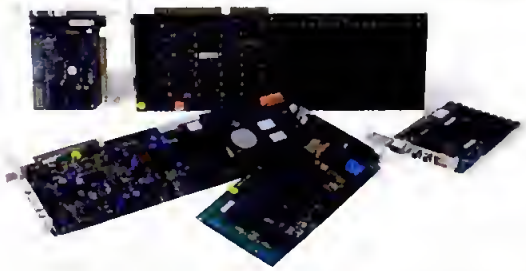
Tape Back-up Subsystems:

- 20MB Irwin with cartridge included $245
- 40MB Irwin with cartridge included 340
- 60MB Maynard Maynstream portable tape backup 935
- 60MB Maynard Maynstream for PS/2 989
- 60MB Archive Internal or External 675

Iomega Bernoullis:

- A220H Dual 20MB External $1630
- A120H Single 20MB External 1195
- A210H Dual 10MB External 1394
- B20M Single 20MB Internal 1195

INPUT/OUTPUT CARDS



- XT-IO +II Card $40
  Parallel Port, 2 Serial Ports (One Stnd., One Optional), Game, & Clock for XT Systems.
- XT-2MB EMS Card 95
  Up to 2 MB Lotus/Intel/Microsoft Expanded Memory.
- AT-IO +II Card 40
  For 286 & 386. Same as XT but without clock.
- AT-2MB Memory Expansion 100
  2 MB Memory Expansion Card, can be configured as either as Extended, or Lotus/INTEL/Microsoft (LIMS) Expanded Memory. 12 MHz, 0 wait compatible.
- AT Multifunction Memory Card 115
  Serial Port, Parallel Port, Game, up to 1.5 MB RAM.

Toll-Free Support

LAPTOP COMPUTERS

- Toshiba 1000; 512K, 80C88 CPU $760
- Toshiba 1100; 640K, 80C86 CPU 1450
- Toshiba 1200; 640K, 80C86 CPU, 20MB ..... call
- Toshiba 3100/20; 640K, 80286 CPU, 20MB ..... call
- Toshiba 3200; 1MB RAM, 80286 CPU, EGA, 20 MB ..... call
- Toshiba 5100; 2MB RAM, 80386 CPU, EGA, 40 MB ..... call
- Toshiba Add-on 5 1/4" External Drive 382
- NEC Multispeed Line ..... call

Call for info and prices on laptop peripherals and accessories!

VIDEO CARDS

- Monographics w/ printer Card, Hercules compatible .. $40
- Color Graphics Card w/Printer Port 40
- ATI EGA Wonder 185
- ATI VIP VGA Card 260
- Hercules "In" Color 299
- NEC MVA 1024 855
- Paradise Autoswitch 480 Card 160
- Paradise VGA+ 239
- Princeton Laserpage for LM300 505
- Princeton Laserview for LM301 505
- NEC GB-1 Multisync Card 225
- STB Autoswitch EGA 130
- Video 7 Vega 173
- Video 7 Vega VGA 268

Custom Designs to Your Specifications:

We'll be glad to customize your configuration to your particular needs and specifications. And if you don't know exactly what you want, call us. We'll be glad to help.

Volume Discounts Available!

Additional volume discounts available to major corporations, academic institutions and computer clubs. Call now and save!

Wide Selection, Name Brand - Low Cost

We offer a wide selection of name brand drives, monitors, I/O Cards, Printers, Laptop computers, and other devices too numerous to list here. Call and ask your PC Brand Consultant for details.

Your PC Brand Guarantees

Free UPS Ground Shipping

All prices include UPS Ground Shipping or equivalent. Or, we'll ship by the method of your choice. Federal Express, UPS Blue, UPS Red, at an additional charge.

Easy Payment Options

Charge your purchase to your VISA or MasterCard. There's no surcharge for using your card. Or pay by check or COD. Please allow one week for personal or company checks to clear. **Purchase Orders accepted** from major corporations with prior credit approval.

30-Day Money-Back Guarantee

We aim to please. If, for any reason, you are dissatisfied with your purchase, simply return it within 30-days (in original packaging and as good as new) for a full refund.

5-Year Limited Warranty Protection

The best coverage in the industry...yours automatically. Warranty covers all PC Brand system motherboards, power supplies, RAM, keyboards and all expansion cards. 100% parts & labor are covered your first year. 80% parts year-2. 60% parts year-3. 40% parts year-4. 20% parts year-5. Additional extended-coverage contracts available for a fee. Floppy, hard disks and tape drives are covered for one year only. Complete warranty information available upon request. Manufacturer's warranty applies to all non-PC Brand products.

Toll-Free Customer Service and Support

As a PC Brand customer, you'll be assigned your own personal PC Brand Consultant...a highly-skilled, technical expert who can help you solve a problem. Or prevent one from happening. Hours: Monday thru Friday, 8 a.m. to 6 p.m., Central Time.

YOURS FREE!

A $35 value...Free with any PC Brand system order of $500 or more. Call today!

Take your choice. A Serial or Bus Mouse Offer good until August 31, 1988. If you do not qualify for our Free Mouse Offer, you may of course, purchase your mouse for $35.

☎ Call 1-800-PC BRAND

(Call 1-800-722-7263...In Illinois, Call 312-226-5200)

PC Brand, Inc. 954 West Washington Street, Chicago, Illinois 60607 1-800-722-7263 Hours: Monday thru Friday 8 a.m. to 6 p.m. Central
VISA, MasterCard, Personal or Company Checks, and Approved P.O.s Accepted. All prices subject to change.

CIRCLE 309 ON READER SERVICE CARD

PC07802

bedford® integrated accounting system

THE BEST

PC MAGAZINE EDITOR'S CHOICE

GENERAL LEDGER • PAYROLL
ACCOUNTS RECEIVABLE
ACCOUNTS PAYABLE
INVENTORY • JOB COST
ALL FOR $249

PC MAGAZINE'S EDITOR'S CHOICE in its review of 59 accounting packages conducted by Price Waterhouse. "This is truly a (complete accounting) system. Bedford's six modules... are easy to install, easy to use, and so well integrated with one another that it makes accounting a snap — even for nonaccountants."

INFOWORLD judged Bedford as 'superb' and selected it as one of the top products of 1987.

The BEDFORD INTEGRATED ACCOUNTING SYSTEM is simply the best small business accounting system available. The User's Guide is superb... and, if you know nothing about accounting or bookkeeping, the BEDFORD ACCOUNTING MANUAL offers a clear, concise tutorial to get you started instantly... right out of the box.

The BEDFORD INTEGRATED ACCOUNTING system is truly remarkable. It's extremely fast, versatile, and Lotus compatible. Automatic posting insures that all balances are up to date. The screens (full color or monochrome) are easy to follow and specially designed to increase productivity. Password protection eliminates unauthorized access to your records. Low cost tractor fed checks, invoices and statements are available. THE BEDFORD INTEGRATED ACCOUNTING SYSTEM IS NOT COPY PROTECTED.

GENERAL LEDGER

- user can define chart of accounts
- entries can be applied to prior periods within the current fiscal year
- immediate reports for any date or period produced on screen or printer including balance sheet, income statement, trial balance, chart of accounts and all journals
- automatically posts from receivables, payables, inventory and payroll so all statements are always current
- automatically displays account descriptions and numbers on screen
- distribute journal entries into multiple revenue or expense accounts, projects, profit centers or departments
- produces full audit trails
- zero balance accounts can be suppressed in reports

PAYROLL

- supports manual or computer produced checks
- automatically calculates all federal and state taxes, unemployment and disability insurance
- supports local taxes
- automatically posts payroll expenses to General Ledger and Jobcost
- allows seven income fields including pay advance and tip fields
- deducts for taxable benefits
- automatically retains QTD and YTD employee earnings, deductions and associated payroll expenses
- accumulates 940, 941, W-2 and state tax information
- produces immediate employee reports on screen or printer including W-2 forms, employee mailing labels, payroll journals, QTD and YTD reports of earnings & deductions, and employee record reports.

ACCOUNTS RECEIVABLE

- uses open invoice method to keep track of full or partial payments against any customer invoices
- fully paid invoice may be purged or retained
- automatically updates inventory and ledger accounts, and project records
- user can define aging periods
- reports produced on screen or printer including mailing labels, aged summary, aged detail and receivables journal
- automatically displays customer names and numbers on screen when required for program input
- prints computerized invoices or supports manual invoicing
- prints computerized customer statements with remittance stubs

ACCOUNTS PAYABLE

- uses open invoice method to keep track of full or partial payments against any supplier invoice
- fully paid invoices may be purged or retained
- automatically updates inventory records, project records and ledger accounts
- user can define aging periods
- produces immediate vendor reports on screen or printer including mailing labels, aged summary and details, and payables journal
- automatically displays vendor names and numbers on screen when required for program input
- prints computerized checks or supports entry of manual checks

INVENTORY

- suitable for manufacturers and wholesalers
- handles state sales taxes
- updates from receivables and payables
- uses weighted average cost method
- handles adjustments and transfers
- automatically flags reorder levels
- reports can be displayed, printed or exported
- expresses selling and cost price to three decimals

JOB COST

- any revenue or expense transaction can be allocated to profit centers, divisions or projects
- paycheck expenses include the company's FICA, FUTA, SUTA and State Disability insurance expenses
- handles up to 999 active projects at any one time
- produces reports on screen or printer including summary and detail reports on revenue and expenses for any project or departments

BEDFORD'S INTEGRATED ACCOUNTING SYSTEM NOT COPY PROTECTED

$249 IBM Version (5¼" and 3½" diskettes come inside each package)...
Works with floppy or hard disk drives.
$349 Macintosh Version

CIRCLE 301 ON READER SERVICE CARD

30 DAY MONEY BACK GUARANTEE

PC EXPRESS™

A Division of PC BRAND

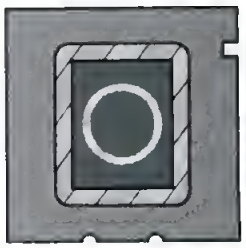
OVERNIGHT SOFTWARE DELIVERY

1-800-321-7733

VISA

150 FIFTH AVE., NEW YORK, NY 10011-4311 PHONE: 212-242-3600
FAX: 212-627-1171 TELEX: 667962 (SOFT COMM NYK)
All prices subject to change. Delivery subject to availability.
See Page 25 For Shipping Charges

■ MITT JONES



PC ADVISOR

A low-cost way to liberate your monitor and keyboard from your system unit, and two products that reeducate the HP LaserJet Series II.

FROM A DISTANCE

I could make much better use of my limited workspace if I could move my system chassis to a cabinet top behind my desk and keep my keyboard and monitor on my desk. This would require that I route the monitor and keyboard cables some 20 feet, however. Any ideas?

Mauro Maschio
West Orange, New Jersey

As you've no doubt learned, moving your keyboard and monitor away from your system unit calls for a bit more than picking up a couple of extension cables. Signal degradation makes simple extension cables impracticable.

The Extender (Cybex Corp., 2800-H Bob Wallace Ave., Huntsville, AL 35805; (205) 534-0011) gets around the problem by boosting the TTL signals before they pass through the cable. Small metal boxes at each end of a ⅜-inch-diameter cable condition the signal and provide the hookups to your system, monitor, and keyboard.

The price of the Cybex kits varies, depending on the length of cable you need and the type of display you use. The Extender 1, which works only with monochrome systems, ranges from $120 for a 25-foot kit to $340 for a 250-foot kit. The Extender 2 works with monochrome, CGA, or EGA signals; it lists at $135 for a 25-foot kit and $245 for a 150-foot kit.

Cybex recently began shipping the Companion, a similar product that adds extra keyboard and monitor connectors at the system end. This allows you to hook two keyboards and monitors to your system—one close to the system chassis and one at a remote location. Prices start at $219 for an MDA/CGA/EGA-compatible 25-foot kit.

SERIES II POSTSCRIPT

I am in the market for a PostScript laser printer. I've heard that there is a product that gives the HP LaserJet Series II PostScript capability. Does such a product really exist? If so, how would such a combination compare with a straight PostScript printer?

Joan Brainard
St. Paul, Minnesota

The product is the QMS JetScript ($2,495; The Laser Connection, P.O. Box 850296, Mobile, AL 36685). JetScript is a full-length adapter you install in your system and a small board that installs in the option slot of the LaserJet Series II.

■ The Companion allows you to hook two keyboards and monitors to your system—one close to the system chassis and one at a remote location.

The adapter board furnishes the Adobe Systems PostScript interpreter, 3MB RAM, and a Motorola 68000 processor running at a speedy 16 MHz. The duo—JetScript plus the Series II—actually outperforms most standalone PostScript printers, thanks to the fast processing and the high-speed data transfer the adapter allows.

You also retain ability to use your LaserJet Series II in its native mode. The JetScript system provides a new hookup between your PC and printer, but it also allows you to maintain the standard parallel port connection. If you send output through that standard connection, your Series II functions as itself. Route output through the JetScript connection and the Series II functions as a PostScript printer.

By the time you add the $2,595 list price of the Series II to the cost of JetScript, you're in the price range you'd expect for a standalone PostScript printer. But the high-performance PostScript ability and the versatility of having two printers in one makes JetScript a smart buy.

Imagen Corp. (2650 San Thomas Expwy., Santa Clara, CA 95051; (408) 986-9400) recently announced a similar product—PC Publisher Kit—which should be shipping by the time this issue hits the newsstands. This $1,995 kit installs in the same way as JetScript. JetScript and PC Publisher Kit differ in other regards, however. Whereas JetScript includes a licensed Adobe PostScript interpreter, Imagen ships its own version of a PostScript-compatible interpreter with the PC Publisher Kit.

■ PC ADVISOR

The PC Publisher Kit also allows the Series II to handle another page description language, Imagen's Document Description Language (DDL), and emulate a wide range of printers. Printer emulations are provided for the Epson FX and MX-80; the Diablo 630; the IBM Graphics Printer; the NEC 3550, 5510, and 7710; and the Qume Sprint 5.

We had not yet received a PC Publisher Kit for evaluation when this issue went to press. Keep your eyes on First Looks for a hands-on review.

COMPAQ KEYBOARD

I recently bought a Compaq Deskpro/286 and I am very happy with the machine except for the mushy keyboard. Does any manufacturer produce an adapter that allows the IBM Enhanced keyboard to work on a Deskpro?

Dave House
Linden, New Jersey

The IBM Enhanced keyboard should work fine with your Deskpro, without an adapter. Your real problem will be finding a spare IBM keyboard. IBM doesn't sell its keyboards separately. Unless you manage to talk someone into swapping an IBM keyboard for a Compaq, your best bet is to find a third-party keyboard you can live with.

Personal preference rules when you are shopping for a keyboard. People seldom agree on which keyboard feels the best. Try to test as many keyboards as passible for yourself before you spend your hard-earned money.

Many IBM keyboard lovers have settled on Northgate Computer Systems' C/T 101 keyboard (2905 Northwest Blvd., #250, Plymouth, MN 55441; (612) 553-0631) as having the closest thing to a true IBM feel. At $99, the C/T 101 provides an IBM-like, clicky feel. The key resistance is noticeably lower than with an IBM, however.

DIALING UP AT&T

AT&T has long offered a toll-free technical support line ((800) 922-0354). Now AT&T's National Systems Support Center has started a bulletin board—a boon for you AT&T 6300 users who are grappling with AT&T-specific problems. The bulletin board includes informative notices that you can either scan on-line or download to read at your leisure. You can also leave messages.

The two access numbers are (201) 769-6397 and (201) 769-5616. Have your AT&T 6300 CPU serial number close at hand when you call: you'll need it for a membership questionnaire you must complete before you're granted access to the conferences.

ASK THE ADVISOR

Send your questions to PC Advisor, *PC Magazine*, One Park Avenue, New York, NY 10016.

WE'VE BUILT A BETTER BROOKLYN BRIDGE WITH VERSION 2.0!

Why Is Our Bridge Better? Because The Brooklyn Bridge™ that John Dvorak, PC Magazine, chose as "The Best of the Best Utilities,"* now gives you more choices!

The Brooklyn Bridge Version 2.0 is more flexible than ever! We've always been the leading file transfer and access utility between IBM compatible microcomputers with any size floppy or hard disks. Now we give your customers a choice between our file manager for the novice user or DOS commands for the more experienced user.

Our new file manager lets you view both local and remote files at one time using a full-screen, dual-directory display with 1-2-3® style menus. Or, you can still transfer files and access peripherals using DOS commands at the command line, within an application, or within your current menu system.

One Printer Can Now Work For Two People!

In addition to our menu system, The Brooklyn Bridge lets you share printers and gives them access to other peripheral devices like tape back-up systems.

Don't Tie Up Your Computer Sorting A Database! RUN Gives You Twice The Power!

PC MAGAZINE Editors Choice

Our exclusive Brooklyn Bridge feature, RUN, provides for dual independent processing which lets you use both the remote and slave computers at one time.

Our DOS Utilities Guarantee Easier DOS Processing!

BACKUP, MOVE, REMOVE and **COPY** save time by allowing you to work with multiple files at one time.

BACKUP saves time by updating your disks quickly and backing up only files that have been changed or created since the last time your disk was backed up.

MOVE lets you work twice as fast by automatically deleting the original once a file has been moved.

If confidentiality is crucial, **REMOVE** has a security option to insure that deleted files are unrecoverable.

Now you know we have built a better Brooklyn Bridge, while still using the fastest attainable serial transfer rate at 115,200 baud, and still saving your customers money by eliminating the expense of an additional external drive.

The Brooklyn Bridge is available through your local dealer or directly from White Crane Systems, Inc. For more information please contact White Crane at **(404) 394-3119.**

THE BROOKLYN BRIDGE™

Just $139.95!

WHITE CRANE SYSTEMS
Suite 151
6889 Peachtree Industrial Boulevard
Norcross, Georgia 30092

THE BROOKLYN BRIDGE, the White Crane Systems, Inc. logo, and WHITE CRANE SYSTEMS are trademarks of White Crane Systems, Inc. Norcross, Georgia U.S.A. IBM is a registered trademark and PS/2 is a trademark of IBM Corporation. 1-2-3 is a registered trademark of Lotus Development Corp. Reprinted from PC Magazine, June 23, 1987. Copyright 1987 Ziff Communications Company

CIRCLE 312 ON READER SERVICE CARD

WHAT THE EXPERTS SAY ABOUT PagePerfect™

"PagePerfect integrates file management, word processing and page layout in an exciting way. Its file management operating shell is spectacular . . . The best I've seen. The page-layout and word-processing functions are superb too."
John Dvorak, San Francisco Examiner.

"If it is true . . . that what people want to do is use their desktop publishing program to both create and format their documents, then PagePerfect is just about their only choice . . .

On a feature list, the difference between PagePerfect and either PageMaker or Ventura wouldn't appear to be great. But when you sit in front of the program, what you get is an experience that starts with word processing and then gives you access to page composition features."
Stuart Alsop, P.C. Letter.

"PagePerfect offers a combination of word processing and desktop publishing that's hard to beat.

Few programs that harbor such power are as easy to use. WordStar and MultiMate commands are supported . . .Includes a spelling checker, thesarus, scanning, 88 Bitstream fonts and a graphics editor—all for $495."
Marvin Bryan, PC Week.

"The best program I've ever seen on a microcomputer."
Steve Wagh, Brown–Wagh Publishing.

PagePerfect let's you create professional looking letters, proposals, newsletters and memos . . . in minutes, not hours! At a price of $495, you can't go wrong by listening to the experts. Call IMSI today for the dealer nearest you (415) 454-7101, (800) 222-4723, or (800) 562-4723.

IMSI™

1299 Fourth Street • San Rafael • CA 94901

CIRCLE 499 ON READER SERVICE CARD

PC EXPRESS™ PROGRAMMER'S WORKBENCH

dBASE AT THE SPEED OF C

dBx Translates dBASE Applications to C

You dBASE™ programmers know what an expressive and readable language dBASE is. It's a very comfortable development environment. But the price is debased performance. Even compiled dBASE doesn't offer the speed that some users require these days. The kind of speed offered by software written in the C language. The answer is dBx™.

dBx translates dBASE to C. It offers you a major competitive advantage over the next dBASE programmer. Keep writing in dBASE. Take every application all the way to completion. Then use dBx to translate them top to bottom to C!

Other advantages: C is portable, even to other operating systems like UNIX/Xenix™. To the Macintosh or Amiga. dBx gives your applications a passport to places dBASE cannot go.

Has its own file manager for single user, but links to major C file managers—c-tree and dBC—for compatibility with dBASE files or multi-user support. We have everything you'll need, including good advice.

	List	Ours
dBx	$550	$419
with Library Source	$950	$725
Call for Full Source Pricing		

BRIEF/dBRIEF

The Power Environment for dBASE Programming

Many worthy utility products supply needs that dBASE®'s programming language doesn't—dUTIL™, dFLOW™ and a host of others. Trouble is, you have to use them separately, then combine their output into your dBASE program files.

No longer. dBRIEF™, written in BRIEF's macro language, grabs hold of BRIEF and turns it into a complete dBASE III and III Plus programming domain. Using BRIEF's underlying shell capabilities and its own interfaces, dBRIEF can run external utility libraries, plus dBASE itself, and link to the Clipper™, Foxbase+™ and Quicksilver compilers, all with dBRIEF still loaded and running the show. It can do what BRIEF already does plus:

- Convert a screen layout into dBASE code for interactive data entry
- Display dBASE file structures in windows, a great convenience alongside your program files
- Expand keystrokes into full dBASE statements
- Indent automatically for clegic display
- Create databases, index files, invoke Ashton-Tate's dFORMAT™ and dCONVERT™, draw lines and boxes

"Simply marvelous programming environment for writing and editing dBASE programs", *PC Magazine*, 7/86. Source code included!

Requires BRIEF 1.32 or later and 384k, 512k to run dBASE within dBRIEF; 640k and harddisk recommended.

BRIEF/dBRIEF List **$275**. Ours **call**

APPLICATIONS PLUS For dBASE

The Complete dBASE Companion

Who says you can't have it all?

APPLICATIONS PLUS has *everything* you need to get the most out of dBASE. An application generator (QUICKCODE PLUS), relational report writer (QUICKREPORT), and graphics system (dGRAPH).

QUICKCODE PLUS offers *dozens* of features you've *never* seen before in a dBASE code generator. Relational applications that read, display, and update a dozen or more databases simultaneously. "Real-time" calculations, performed *on screen* as the user enters each field. Forms up to 11 screens long, with the ability to pass data between screens. Computational formulas that automatically combine data from *different* databases. 9 Data types. 16 field types.

QUICKREPORT is a full-featured relational report writer, which combines up to 6 databases in one report, handles many-to-one relations, fancy printer features (like **bold** and *italics*), computed fields, and up to 16 levels of totalling and sorting.

dGRAPH is a graphics system that produces bar, pie, line, and piebar charts directly from dBASE data. Dozens of options let you tailor graphs to your needs.

APPLICATIONS PLUS is 100% compatible with Clipper and FoxBASE+.

	List	Ours
APPLICATIONS PLUS	$299	Call
QUICKCODE PLUS	$295	$170
QUICKREPORT	$295	$170
QUICKENTRY	Call	Call

MICROSOFT LANGUAGES

Powerful Implementations Of The Most Popular Programming Languages

Microsoft C 5.0. The flagship of the Microsoft line runs up to 30 percent faster than its predecessor. Its new optimization features deliver untouchable execution speeds. 100 new additional library routines.

Microsoft MacroASSEMBLER 5.0: If you ever wanted to take on the challenge of assembly, here's your opportunity. "MASM" 5.0 is a lot easier to use, has completely revised documentation, and a new "Mixed Language" programming guide that gives you step by step instructions for linking your assembly code with other Microsoft languages.

Microsoft QuickBASIC 4.0: is a revolutionary concept in BASIC programming. It allows you to run, edit, debug, and run again. Our friends at Microsoft have eliminated the dreaded compile step. Whenever you edit your code QB4 automatically incorporates your changes, so that it can run a program of 150,000 lines in less than a minute.

Each member of this language family includes the renowned debugger CODEVIEW.

	List	Ours
Microsoft C	$450	$295
Microsoft Macro-ASSEMBLER	$150	$109
Microsoft QuickBASIC	$ 99	$ 66
Microsoft FORTRAN	$450	$295

NOVELL: BTRIEVE, XQL, XTRIEVE

Sophisticated Tools Essential For Fast Database Handling

Btrieve is a library of subroutines that allows the programmer to build a database application using any language. It takes complete charge of all file creation, indexing, reading, writing, insertion, deletion, forward and backward searching. Its balanced tree indexing scheme finds any key in a million in less than 4 accesses... That's fast!

Btrieve is multi-lingual also. It includes more than 20 language interfaces (including C, BASIC, PASCAL, FORTRAN). However if it turns out that you are using something a little unusual, worry not. The manual includes a chapter on how to write a language interface to Btrieve.

Btrieve's vital statistics are equally impressive. Files may have up to 24 indexes, fixed record length to 4090 characters, variable length to 64K, indexes to 255 characters, files of 4 billion bytes. Network support includes Novell, 3-COM, IBM PC NET, Software Link's Multilink and many others.

XQL is a relational database management system designed especially for programmers. Imagine being able to access your database with the ease of SQL (Structured Query Language) statements and still having the power to process that data right down to the byte level.

Think about your applications. A large part of your software development effort is probably devoted to managing data stored in files on disk. Hours spent writing lines of code to search and store data records could have been used to program more important parts of your application. Why not let XQL do it for you. XQL will increase your programming productivity and let you focus on building better applications.

The XQL system works in tandem with Btrieve and has an equally powerful chassis. No limit on the number of records per file. Max. file size is 4 gigabytes. Max. record size equals 4K. Max. indexes per file is 24. The one version works for single or multiuser systems. DOS Ver 3.0 or greater. All languages are supported.

Xtreive is the final ingredient in the Novell programming recipe. It is a menu driven, data retrieval system, that allows you to quickly find information and display reports. System developers can easily customize Xtreive to display command menus, help files, and error messages in the English spoken by the customer. Xtreive screens then gives menu choices that users can quickly recognize, making Xtrieve an easy product to use and understand.

Report Option for printing customized reports, form letters, mailing labels & statements.

	List	Ours
Btrieve	$245	$175
Btrieve/N	$595	$445
XQL	$795	$595
Xtreive	$245	$220
Xtreive/N	$595	$459
Report Option	$145	$128
Report Option/N	$345	$269

GSS GRAPHICS SYSTEM

Leave the Device Driving to GSS

For serious applications stick to the tools that stick to the standards. Not the least of reasons why GSS™ has emerged as the pre-eminent graphics toolmaker is that it has always conformed to ANSI standards.

At the heart of the system is the CGI standard Development Toolkit. It has all language interfaces and device drivers for keyboards, mice, joysticks, tablets, printers, plotters, cameras. The drivers completely insulate your application from concern for device idiosyncracy.

GSS Kernel™ conforms to ANSI's GKS 2b and has all its drivers and language bindings. Macro level tools to draw, color, segment, transform, store and recreate an object. The Metafile Interpreter reads ANSI CGM files with full CGI capability for recreation on various devices.

Quality software? IBM thinks so. They sell GSS under their own label. Royalties.

Needs 256k	List	Ours
CGI Dvlpment Toolkit	$495	$375
Kernel System	$495	$375
Kernel for IBM RT	$795	$645
Metafile Interpreter	$295	$235

CLIPPER $399

R&R RELATIONAL REPORT WRITER $129

MORE PROGRAMMING TOOLS FOR...

dBASE, C, FORTRAN, BASIC, COBOL, PASCAL

dbc ISAM, FoxBASE, Greenleaf, Halo '88, Logitech MODULA, MicroFocus COBOL, Norton Utilities, Panel Plus, Periscope, Phoenix, Polytron, RM/COBOL, Sprindrift, Tom Rettig's Library, Windows for Data...and many more.

Call or write for prices and information.

PC EXPRESS™

A Division of PC BRAND

OVERNIGHT SOFTWARE DELIVERY

CIRCLE 303 ON READER SERVICE CARD

1-800-321-7733

VISA MasterCard

150 FIFTH AVE., NEW YORK, NY 10011-4311 PHONE: 212-242-3600
FAX: 212-627-1171 TELEX: 667962 (SOFT COMM NYK)

All prices subject to change. Delivery subject to availability.

Shipping via UPS $6.00. $3.00 for each additional product. Call for overnight delivery charges.

UNBELIEVABLE HARDWARE SPECIALS

FIVE YEAR WARRANTY

BUY IT! OR LEASE IT!

AS LOW AS $99.97 PER MONTH

PC TURBO EXPRESS XT

Fully loaded! Fully IBM Compatible. Fast NEC V20 CPU (more than twice the processing power of a standard 8088), 512K (expandable to 1024 RAM), 4.77/8 MHz speed, FCC Approved, Clock/Calendar, 2 Parallel Printer Ports, 1 Serial Port, Game Port, AT-Style Keyboard, 8 expansion slots, 1 floppy disk drive, 1 20 Megabyte Seagate Disk Drive with controller, Hercules compatible graphics card, Samsung or Magnavox monitor included... $995 or $99.97/Month (1 Year).

PC TURBO EXPRESS AT

Fully loaded 80286-10 AT Compatible with 12 MHz Speed and 16 MHz throughput, FCC Approved, 512K RAM (expandable to 1024K), Clock/Calendar, Parallel Printer Port, 101 key AT-style keyboard, 8 expansion slots, fast 40 Megabyte Seagate hard disk drive with controller, Samsung or Magnavox monitor included... $1799 or $79/month (3 Years).

386 SUPER TURBO EXPRESS

Fully loaded 386, 100% IBM Compatible, 80386-16, 1024K RAM on board, fast 80 mb Seagate hard disk drive with controller, FCC Approved, Clock/Calendar, Parallel Printer Port, Serial Port, 8 expansion slots, 16 MHz speed and throughput, Hercules compatible graphics card, Samsung or Magnavox monitor included... $3495 or $129/month (3 years).

Call for prices for other configurations and other hardware products. EPSON and Okidata printers, Toshiba Laptops, Novell, 3COM and other networks are available for purchase or lease.

PC EXPRESS SOFTWARE SPECIALS – WE BEAT THE COMPETITION!

ACCOUNTING BUSINESS

Dac Easy Accounting 2 0	$ 59
Peachtree Complete Accounting	$149
In-House Accountant	$ 59
Managing Your Money	$117
LandLord (Property Management System)	$595
Timeslips III (Time and Billing)	$114
Retail Store/Computer Cash Register Software	$395
Bar Code Reader for above	$595
Cash Drawer for Above	$495
Video/Liquor Store Management	$795
Beauty Salon Accounting	$795
The Auto Repair Shop Controller	$795

WORD PROCESSING/DESKTOP PUBLISHING

NEW WordPerfect 5.0	$249
Publisher's PicturePak for WordPerfect (3 Paks available)	$ 99
Publishers PicturePak Collection for WordPerfect (all 3 Paks)	$199
Microsoft Word 4 0	$199
Multimate Advantage II	$249
WordStar 2000 Plus	$195
RightWriter (Grammar Checker)	$ 89
Grammatik II	$ 89
Byline	$169
Pagemaker	$442
Ventura	$469
PFS First Publisher	$ 58

SPREADSHEET

Lotus 1-2-3	$299
Lotus Ready to Run Accounting (G/L,A/R,A/P,Payroll,Inventory)	$199
Individual Lotus Accounting Modules as above A/R, A/P	$ 49
General Ledger, Payroll, Inventory	$ 69
Quattro	$128

PRODUCTIVITY TOOLS

Harvard Total Graphics	$297
Q & A	$207
Q & A Write	$117
Sidekick	$ 55
Sidekick Plus	$127
Microsoft Mouse with Paintbrush	$109
Easy Mouse (as above, non-branded)	$ 79
PFS First Choice	$ 89
FormTool	$ 58

PROGRAMMING TOOLS

dBASE III Plus	$375
PC Tools Deluxe	$ 59
Clipper	$375
Norton Advanced Utilities	$ 79
dBx Translator (translates dBASE code into C)	$419
Brief (dBrief (the perfect program editor for real dBase programmers!	$219
Btrieve (Novell)	$175
XQL	$595
Xtrieve	$220
Applications Plus (Fox & Geller)	$229
Microsoft C 5 1	$295
Microsoft QuickBasic 4 0	$ 66
Microsoft Basic Compiler 6 0	$249
GSS Graphics Systems CGI	$375
Mace Utilities	$ 58

PC EXPRESS EXCLUSIVE HOT LINE

READY TO RUN ACCOUNTING WITH LOTUS 1-2-3 (Wasasoft)

A completely integrated, full featured, easy to run accounting system that works under full control of Lotus 1-2-3. Purchase individual modules or the complete system.

General Ledger	$69 95	Payroll	$69 95
Accounts Receivable	$49 95	Accounts Payable	$49 95
Inventory Control Order Entry	$69 95	Complete System (all five modules)	$199 95

LANDLORD/LANDMASTER (Systems Plus)

The LANOLORD is a complete property management system that prints tenant statements, generates lease expiration lists, identifies late payers, produces vacancy reports, prints checks and performs all functions required for landlords and anyone who manages apartments, condominiums, shopping centers or any commercial properties $595

The LANDMASTER contains all the features of the LANDLORD plus adds a complete double entry accounting system to the package for general ledger, accounts payable and accounts receivable $1250

PARAGON/ISHER PARAGON (THE ACCOUNTING SPECIALISTS)

You've tried Peachtree, Bedford or DAC accounting systems and have found that you need more! PC EXPRESS is an official dealer for the highly rated PARAGON ACCOUNTING SYSTEM. PARAGON was designed with the business owner and manager in mind. Because of its intuitive design, you can operate PARAGON using your own business knowledge ...not accounting expertise. Pop-up your customers, inventory items, an employee ...all instantly. PARAGON delivers unparalleled flexibility and performance. PARAGON is a completely integrated accounting system that includes General Ledger, Accounts Receivable, Accounts Payable, Payroll, Inventory, Invoicing and Sales Analysis ...all for $695.

TURBO PARAGON contains all the features found in PARAGON plus JOB COSTING, ESTIMATING and a complete REPORT WRITER $995
Networking Versions of PARAGON are available

RETAIL CASH REGISTER CONTROL (Microbiz Corporation)

The MICROBIZ RETAIL STORE SYSTEM is an extraordinary system for managing all retail store sales, customers and inventory. Quickly bill your customers, keep track of your inventory, commissions, look up prices, print cash register receipts (or complete invoices) and perform all the day to day functions required to keep you on top of your business and its cash flow. It's time to computerize ...all for $395.

Optional add-ons to your Retail Store Software System ...a complete cash drawer that plugs into your IBM PC or compatible, a receipt printer and bar code reader.

Systems are also available for Video Stores, Beauty Salons, Liquor Stores, Auto Repair Shops and other vertical markets

101 MACROS FOR LOTUS 1-2-3 (Micropak)

At $69 95 it's a bargain. If you use Lotus 1 2 3, you can add word processing, a pop up calculator, passwords, custom menus ... plus automate your spreadsheets, speed data entry, shorten calculation time, eliminate repetitive operations, fancy borders and presentations... Save Keystrokes, Time and Money... all with:

101 MACROS FOR SYMPHONY	$69 95	101 MACROS FOR LOTUS 1-2-3	$69 95
101 MACROS FOR SUPERCALC	$69 95	101 MACROS FOR EXCEL	$69 95
101 UTILITIES FOR DBASE III PLUS	$69 95		

Please call or write for our FREE 48 page full color catalog containing more than 100 000 hardware and software items ready to be shipped. All prices and specifications are subject to change. Delivery subject to availability.
Add $6 for shipping of the first item ($3 for each additional item).

CIRCLE 304 ON READER SERVICE CARD

PC EXPRESS™ 1-800-DIAL-PCX

VISA MasterCard

OVERNIGHT SOFTWARE DELIVERY

(That's 1-800-342-5729)

All prices subject to change. Delivery subject to availability.

150 FIFTH AVE., NEW YORK, NY 10011-4311 PHONE: 212-242-3600
FAX: 212-627-1171 TELEX: 667962 (SOFT COMM NYK)

LIBRARY SUPPORT.

ANOTHER CAREER OPPORTUNITY FOR PCs *WITHOUT* OUR 386 MOTHERBOARD.™

***With* Our MotherBoard, Your PC, XT or AT Can Run New OS/2 Releases!** If you'd rather keep your computer on your desk than under foot, get our 386 MotherBoard. Our Board will give your spreadsheet, complex CAD and graphics, and multitasking applications a boost to boast about. In fact, our line of MotherBoards accelerate your PC, PC/XT, PC/AT or clone to speeds equal to the IBM PS2 Model 80. And faster. Because we've built in 1 Megabyte of high speed RAM and a 387 math coprocessor socket.

Accelerator Cards Have No Future. An accelerator card can only turn an obsolete computer into a faster obsolete computer. Our MotherBoards advance your computer into a new 386 system! They run OS/2, Windows/386, UNIX V and PC-MOS/386. For more power, you'll find 16-bit expansion slots that accommodate the latest I/O expansion cards. **Only our 386 MotherBoards give your PCs an unlimited future!**

The Critics Applaude! *PC Magazine* awarded our Board "The Editor's Choice" for 386 Replacement Boards. *PC World* called it "the Upgrade Product of the Year."

Technical Features ▪ 16 Mhz 80386 ▪ 1 Megabyte of 100 nsec 4-way interleaved RAM ▪ PC/AT compatible I/O and BIOS for support of OS/2 ▪ Six 8-bit expansion slots ▪ two 16-bit expansion slots; four on 386 MotherBoard/AT ▪ One 32-bit expansion slot for up to 12 Megabytes of high speed memory ▪ Battery-powered clock calendar

386 MotherBoard/PC or MotherBoard/XT	$1495
386 MotherBoard/AT	$1595
32-bit RAM Board (2 Mbyte installed; up to 4 Mbytes)	$495
16 MHz 80387 math coprocessor	$695
16-bit combination hard disk/floppy disk controller	$245

Step up your PCs with our easy-to-install 386 MotherBoards. For more information, call: **1 (800) 443-6284**. In New York: **(516) 434-1600**. All our products are available at your local computer dealer!

Hauppauge Computer Works, Inc.
175 Commerce Drive,
Hauppauge, New York 11788

Hauppauge!

CIRCLE 276 ON READER SERVICE CARD

Trademarks: IBM PC, XT, AT and PS2: IBM.

PC MAGAZINE

FIRST LOOKS

Toshiba 386-Based T5100: Heavy on Performance, Light on Convenience

PC HANDS ON

BY JOHN DICKINSON

Given Toshiba's outstanding performance in the laptop arena, the company's new 386-based T5100 offers what at first seems like an ideal configuration for taking high performance on the road. Though not as speed-conscious as a few lunchbox-type portables, the T5100 is easily the fastest and most powerful laptop on the market.

However, using the T5100 for a while may convince you that this 15-pound laptop is not the ideal traveling companion.

The screen is the biggest source of bad news about the T5100. It's of the gas-plasma variety, all right—undoubtedly the most glamorous laptop-screen technology available. But, like the new generation of Compaq portables, it has low-contrast EGA compatibility with only three gray scales to simulate different colors.

The Toshiba T5100 delivers powerhouse performance for a laptop machine, but, nevertheless, it has its shortcomings.

In addition, Toshiba designers decided to try to take advantage of the 400 vertical dots on this screen by defining a character set that is one dot higher than the standard EGA character set. I found the resulting extra-tall characters rather annoying, whether using the normal single-dot or bold double-dot display.

My complaints to Toshiba about the low-contrast screen were answered with a new unit that admittedly sported a somewhat better screen. But even the better version couldn't compare to the GRiDCase 1350's high-contrast gas-plasma screen (see

(continues on page 35)

IZE: Links to Applications Add New Twist to Managing Free-form Text

PC HANDS ON

BY NEIL J. RUBENKING

At its worst, Persoft's *IZE* rates as an excellent free-form information manager. At its best, it constitutes an entirely new way of integrating the applications and information you use.

IZE achieves this integration by coupling an exceptional search engine with the ability to link to external files and their applications. In other words, when a search yields a link to a non-*IZE* file, following that link automatically invokes the appropriate application for editing the file.

There's no need to reenter volumes of existing data into *IZE*. *IZE*'s Import facility can bring in even large files containing many items and can split the files into separate "texts"—the basic unit of *IZE*.

You tie keywords to texts either manually or by using an automatic filter, known as a keychanger in Persoft parlance. If imported texts include lists of keywords, you can tell *IZE* where to find them by pinpointing their location within the document. *IZE* also sports its own editor, so you can create new texts within the package itself.

Once you've imported or created your texts, you're ready to begin searching—and appreciating the real power of *IZE*.

IZE provides all the keyword-searching abilities you'd expect from a free-form information manager, including the use of logical operators to combine keywords. You can also make use of fuzzy keyword searches—searches that return approximate matches as well as exact hits. A search of the fuzzy keyword "exit," for instance, might include a reference to a keyword "exist."

Macros allow you to specify common sets of keywords as one word. You can also search for words that are not keywords; *IZE* will search every text for the word at blinding speed.

(continues on page 34)

HANDS-ON INDEX

EMERALD BAY/EAGLE
Distributed database engine and front end 36

SUPER CARTRIDGE I
Replaces 23 HP font cartridges 38

DAN BRICKLIN'S DEMO II
Adds frame grabber 43

CURAM 80-8
32-bit RAM for the PS/2 Model 80 43

GEM SCAN
GEM-based scanning software 46

DRAW APPLAUSE
Presentation graphics 48

NORTHGATE POWER 386
Static-RAM cache and high-performance disk in a $4,295 system 54

Photograph, Thom O'Connor

IZE

(continued from page 33)

The *IZE* outline view—one of its most powerful features—helps you narrow your search and follow links once you've specified your keywords.

The outline lists each text targeted by your keyword search and totals up the frequencies of all the additional keywords in each selected text. Each entry in the outline is either a link to a text or a link to another outline. *IZE* ensures that the outline always fits on one screen.

You can expand sections of the outline, browse through all the chosen texts, or use the information the outline contains to build a new query.

To reach a file belonging to another application, you simply move the cursor to the corresponding "hot link" and press Enter. As long as *IZE* has a driver for the application that created the file, it will invoke the application and automatically load the correct file.

If you need to link to a program that's not one of the 25 or so already supported, you can create your own driver easily enough. Persoft documents the necessary information—such as directory path and program name—and the installation program includes an option to create a new driver.

The *IZE* editor definitely isn't for writing books. Its modest but complete text editor is best suited to shorter texts. The editor features easy mnemonic commands and simple formatting features, such as headers, footers, and margins.

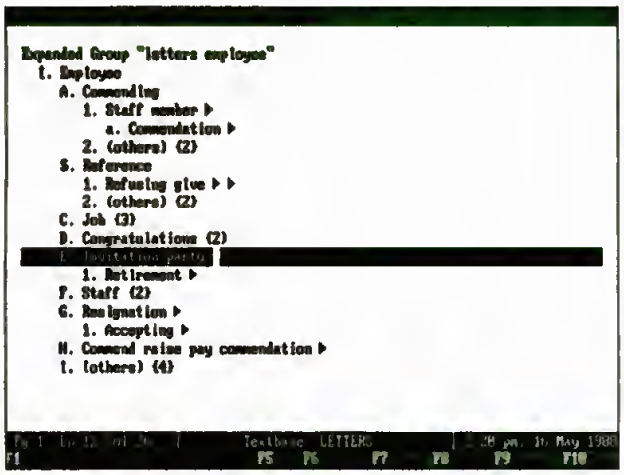
The editor supports all major printers, however, and is completely satisfactory for office letter writing. In fact, one sample textbase contains hundreds of standard form letters.

You can insert hypertext-like links between texts within the editor. Just tack down one end of the link, then find the other end and connect it. Thereafter, by simply hitting the Enter key with the cursor on the link symbol, you can jump back and forth between the linked texts.

Searching, linking, generating outlines—these are *IZE*'s specialties, and they're very fast. Other functions are not so fast, however. Allow hours rather than seconds for importing large files into the program.

Persoft may yet have a few loose bolts to tighten within *IZE*. Something in my true-blue antique IBM PC interacted nastily with it, disabling the application links. On an up-to-date 80386 machine, it worked beautifully but occasionally seized up on full text searches.

There's no handy physical metaphor for the way *IZE* links items in a textbase. It doesn't just offer a faster way to search free-form data. Rather, it offers a whole new way of working with your computer. You may find that the way you naturally work makes more sense than other applications have led you to believe.



The IZE outline screen represents links to texts with a solid arrow and links to other outlines with a number in braces. The number is a count of texts in the indicated outline.

Agenda: Lotus's Answer to Information Management

Cross a pad of Post-its with a database, toss in a dash of hypertext, murmur the letters "AI," and you've got a rough approximation of *Lotus Agenda*. We got our hands on an early preview copy of this $395 "personal information manager," and, if reaction here is any indication, this program promises to be a hit.

While *Agenda*, *IZE*, Symantec's *Grandview*, and others share common ground as information managers, they're more different than any three word processors or databases.

Agenda is an organizer for thoughts, staffing plans, sales contacts, and ideas generated by blurbs in *Forbes*. Big deal: an outliner or a word processor outfitted with text retrieval software can hold that information, too. *Agenda*, however, doesn't restrict you to one or two static views of your information. It's a natural for anyone whose job involves managing ideas.

The *Agenda* metaphor comprises three building blocks: items, categories, and views. Items are how you enter information, categories are how you file information, and views are how you look at the information.

For example, I've been using a prerelease version of *Agenda* to manage *PC Magazine*'s feature story assignments. The elements are the year's 22 issues, editors managing the issues, topics, writers, and deadlines. Separate *Agenda* views might show the story lineup for a single issue, all the LAN reviews throughout the year, or stories written by individual authors. *Agenda*'s predecessor was a 10-foot-wide bulletin board covered with 3 by 5 cards.

Other bells and whistles:

- "Conditions" and "actions" help automate the organization of your thoughts. You might, for example, specify that any item containing the phrase "Quimby contract" be automatically routed to Phil, unless "Jennifer" is also in the item, in which case it's routed to her.
- Notes. You can add notes (10K) to your items, import, or simply reference external files. The external file could be an e-mail message or the text of a newspaper article on grain futures. *Agenda* can categorize or assign based on the content of the notes.
- Smart date arithmetic. *Agenda* understands "last Friday," "end of July," and "every Friday" as dates. It even understands "fortnight." You can restrict, or filter, your view to items falling between two dates.

The DOS version of *Agenda* is slated for shipping in a few weeks and the OS/2 1.0 version about 3 months later.

—Bill Howard

FACT FILE

IZE
Persoft Inc.
465 Science Dr.
Madison, WI 53711
(608) 273-6000
List Price: $445
Requires: 512K RAM; hard disk plus one floppy disk drive, or two high-density floppy disk drives; IBM PC, XT, AT, PS/2, or compatible; DOS 2.0 or later.
In Short: An excellent free-form information manager that goes beyond the ordinary. Startlingly fast keyword searches and the ability to invoke other applications put it in a class by itself.

CIRCLE 448 ON READER SERVICE CARD

Toshiba T5100

(continued from page 33)

PC Magazine, March 29, 1988).

As a consolation, the T5100 will accommodate an EGA monitor via a 9-pin D-connector on the system's rear panel. However, a separate EGA monitor is not exactly a luggable solution to the T5100's screen problem.

The T5100's overall performance leaves little to be desired. Indeed, Toshiba deserves credit for packaging so much power in such a small machine.

Its power comes from a 16-MHz 80386 Intel microprocessor, 2 MB RAM (which is upgradable to 4MB), and a 29-millisecond, 40MB hard disk drive. The standard configuration also packs a 1.44MB floppy disk drive and a socket for an optional 80387 numeric coprocessor.

The hard disk was the biggest surprise, earning an impressive 38-ms. access time on PC Labs Benchmark Tests. More importantly, it keeps up with most full-size machines when it comes to DOS file access times, where disk performance really counts. If Toshiba supplied a disk-caching program, the T5100's hard disk performance would rate even better.

The microprocessor and memory perform right up there with Compaq's Deskpro 386 (the company's 16-MHz machine) and, for that matter, any 16-MHz 386 you could name.

You're also not likely to come up with any compatibility problems running the T5100. Toshiba has been too successful at making PC-compatible laptops for too long to fool with anything that won't run the full gamut of DOS software. The T5100 ships with MS-DOS, Version 3.2, which is adequate but does not support *Windows/386*. Toshiba reports that DOS 3.3 is being prepared for distribution "at a later time," along with a laptop version of OS/2.

Toshiba makes one of the best portable keyboards around. It's got a predictably rattly feel that makes me feel at home, possibly because I'm so used to typing on a T1000. The keys are in a nicely compact arrangement that gives you all the keys on an 83-key keyboard, albeit in modified locations, and complies with most users' needs. Unless, that is, you're looking for a 10-key numeric keypad—which Toshiba will be happy to supply you with as an additional option.

It's hard to find this much computing power in a 15-pound package anywhere else. But one must wonder exactly what niche the T5100 will fill.

It's hard to find this much computing power in a 15-pound package anywhere else. But one must wonder exactly what niche the T5100 laptop will fill.

At 15 pounds, it's too heavy for my tastes in a laptop machine, and a laptop that requires a power cord seems like a silly idea to begin with. At $7,499, the T5100 is also expensive. If high-powered portability is your quest, a portable lunchbox-style computer like the Compaq or Dolch-Pack might serve your needs as well. After all, 20 MHz in Compaq's pail is only $500 away. PC

FACT FILE

Toshiba T5100
Toshiba America Inc.
Information Systems Division
2441 Michelle Dr.
Tustin, CA 92680
(714) 730-5000
List Price: With 2MB RAM, gas-plasma screen, 1.44MB floppy disk drive, 40MB hard disk, $7,499.
In Short: Exceptional performance for a laptop. But the machine's lackluster display, 15-pound weight, and power-outlet requirement cast doubts on its desirability.

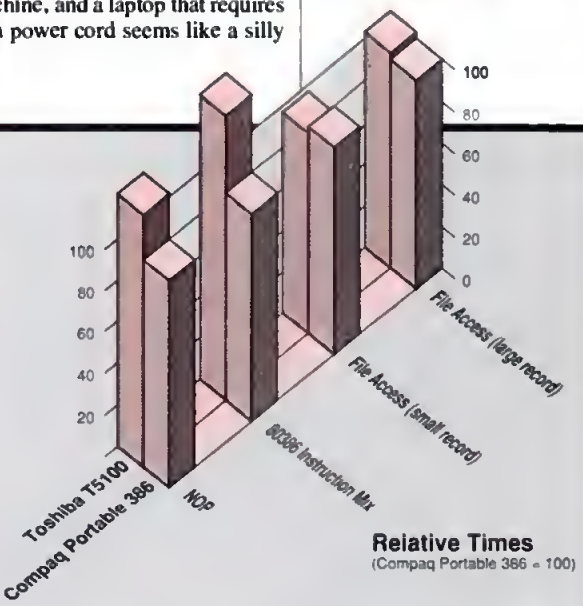
CIRCLE 445 ON READER SERVICE CARD

Benchmark Tests: Toshiba T5100 vs. Compaq Portable 386

Toshiba's 16-MHz 386-based portable pumps instructions at a slightly slower rate than Compaq's 20-MHz 386 portable, but the Toshiba's hard disk fetches data at speeds comparable to those of the Compaq portable.

Performance Times
(Times given in seconds)

	NOP	80386 Instruction Mix	File Access (small record)	File Access (large record)
Toshiba T5100	2.08	4.45	62.87	14.35
Compaq Portable 386	1.71	3.24	64.89	13.93



The **NOP** benchmark test is designed to measure raw clock speed and memory access time while minimizing differences in microprocessors and the effect of memory caching. This test executes almost nothing but NOP ("No Operation") machine code instruction in a big 128K loop.

The **80386 Instruction Mix** benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 80386 instruction code. These instructions are a subset of the total processor instruction set. The 80386 Instruction Mix implements a number of 32-bit operations. In the 80386 processor these become single instructions, whereas in the 8086 and 80286 versions of the benchmark test they remain multiple instructions.

The **File Access** benchmark test measures the time it takes to perform a series of disk operations: a sequential create and write of a 256K data file, a sequential read of the same file, a random write, and a random read. The first set of results reports the time required to perform the test using record lengths of 512 bytes and 4K. The second set of results is the time required to perform the same test using 16K and 32K records. The larger record sizes show how a disk will perform in loading large programs and loading and saving large data files. Higher throughput systems such as RLL drives will show better performance in the large record test.

Emerald Bay and Eagle: The New Breed of Database Manager, Almost

PC HANDS ON

BY GENE SMILGIEWICZ

Migent's new distributed-processing duo—*Emerald Bay* and *Eagle*—represent the shape of database management systems to come. *Emerald Bay* comprises the database engine, while *Eagle* serves as a separate front end. The products are the brainchild of Migent founder Wayne Ratliff, who was instrumental in developing Ashton-Tate's *dBASE II*.

Though the *Emerald Bay Database Server*—the multiuser *Emerald Bay* engine—won't ship until the end of June, *Eagle* incorporates a single-user *Emerald Bay* engine that offers the same data-storage features without the multiuser capabilities.

Eagle, including its engine, is bug-laden and lacking in some features—a result of Migent's rushing the product to market. Migent has vowed to support purchasers of early releases "like kings," however, with a steady stream of free bug fixes, upgrades, and hot-line support, not to mention an ISV program for developers.

The single-user engine bundled with *Eagle* mirrors the coming *Emerald Bay Database Server* in its data storage abilities. The *Database Server* will add transaction processing and a powerful array of multiuser features.

The single-user engine comprises the database engine program and several core component utilities. The engine performs as a TSR program or a co-resident process occupying 130K RAM.

Emerald Bay databases are composed of up to 1,000 data tables contained in a single disk file, supported by a like number of indexes in a related index file. A database table record can contain up to 800 fields and 10,000 bytes, using the nine finite field data types that are available.

A variable-length "binary" field type, which did not function properly in the review copy, allows up to 2 billion bytes of storage per field and can contain any type of data.

The largest character field may be 512 bytes, while a special "packed" field can contain up to 1,024 numeric and punctuating characters. The four numeric data types offer similarly scaled precision. 1 particularly appreciated the field replication factor, which allows any field to be treated as a unidimensional array of up to 100 elements.

A data table can contain up to 2 billion records, and seven databases may be open at one time. In other words, up to 7,000 tables plus 7,000 indexes can be active at any time.

Using the database administrator is a straightforward process, though inexperienced users may be nonplussed by the impressive security provisions.

The data form generator and entry components are nothing to write home about, but the report writer, oriented to programmers, is well implemented and looks quite powerful.

The import/export module supports ASCII, *dBASE*, and *Lotus 1-2-3* formats, as well as creation of control files to facilitate repetitive operations.

Eagle

Once you've defined the tables and indexes for your databases, you can invoke *Eagle* and operate in command mode, á la *dBASE*, or develop and run application programs. As a nice touch, *Eagle* includes its own fine text editor.

This initial version does not supply the promised compiler or its ultimate feature set. It's also flawed by more than a few bugs. Nevertheless, I found it exciting to use.

Ratliff obviously reworked some of the basic functions botched in *dBASE*, implementing the *Eagle* features more effectively as a result. With *Eagle*, when you delete a record it is gone forever. No more annoying PACKing.

Gone, too, is the need to constantly index data. Once defined, indexes are maintained automatically, whether used to control a table sequence during updates or left "idle" during the process.

In general, *Eagle* is very elegant in the way it manages data storage and in the tools afforded to manage memory requirements. Modules of code and binary routines may be swapped in and out of memory at will. Memory-variable usage is limited only by available memory and may include 13-dimension arrays of up to 10,000 elements. The only price you pay for all this is more-stringent data typing requirements.

Eagle provides most of the commands and functions necessary to create complex application programs, as well as the means to create user-defined functions and to call external binary routines.

How well all these features work together under the stress of real-world loads will be open to debate until a stabilized version is available.

All in all, the intrinsic merits of the initial release of *Eagle*, with its single-user *Emerald Bay* engine, far outweigh its deficiencies.

The inherent superiority of Migent's distributed approach, coupled with the inspired coding of an older and wiser Wayne Ratliff, make *Emerald Bay* and *Eagle* worth wrestling with. PC

Distributed Database Processing

Distributed database processing separates the front-end user interface from the engine that performs the actual, nitty-gritty data storage and retrieval.

In a nondistributed DBMS, when a user indicates that he wishes to index a data file, for instance, the front end forwards the instruction to the integrated engine. The integrated engine in turn passes a request to the network file server to send the contents of the database over the network back to the workstation running it.

After the data records are indexed, the index file is saved back to the network server. Sending large files not only ties up the network but also increases the risk of data corruption due to transmission errors.

In a distributed DBMS, the engine runs on the server itself. The front end's workstation simply forwards a terse indexing instruction over the network to the database server. The database engine then performs the index operation on the file, located on one of the server's disks, and sends only a completion code back to the originating workstation when done.

—Gene Smilgiewicz

PC MAGAZINE FACT FILE

Emerald Bay
Eagle
Migent Inc.
865 Tahoe Blvd.
P.O. Box 6062
Incline Village, NV 89450
(702) 832-3700
List Price: *Emerald Bay Database Server*, $695; *Eagle* (incorporates single-user *Emerald Bay* engine), $495; Developer's Toolkit for C, $495.
Requires: 640K RAM, DOS 3.1 or later. Hard disk recommended.
In Short: A bug-laden but worthwhile initial release of a ground-breaking product. Comprises a separate database engine and front-end user interface for distributed processing. Not copy protected.

CIRCLE 450 ON READER SERVICE CARD

YOUR WORD PROCESSOR GIVES YOU THE POWER.

RIGHTWRITER® GIVES YOU THE CLARITY.

RightWriter Checks The Grammar, Style, Usage, And Punctuation In All Your Business Writing.

RightWriter helps you produce clear, powerful business writing. Not a spelling checker...RightWriter is a sophisticated expert system for checking errors in grammar, style, usage, and punctuation. RightWriter is aimed at producing better writing, not more writing. RightWriter helps you write like a pro.

•RightWriter Is Extremely Easy To Use
You create your document as you normally would. You then run RightWriter on it, using a simple one word command. Your word processor does the rest.

•RightWriter Inserts Messages Directly In Your Text
RightWriter creates a marked up copy of your original document with comments pointing out errors in grammar, style, usage, and punctuation.

•A Readability Index And A Strength Index
The Readability Index shows the educational level a reader requires to understand your writing. The Strength Index measures your writing's strength of delivery. Other indexes measure your use of adverbs and adjectives, and the use of jargon in your writing.

•Works On IBM PC, Compatibles And PS/2 With Most Word Processors
RightWriter supports most word processors including WordStar,® WordPerfect,® Microsoft Word,® MultiMate® and others.

Here's what the experts are saying about RightWriter

"I rarely recommend software as a must buy, but in the case of RightWriter -- four stars throughout"
-Family Computing

"...a must buy for the businessman who writes memos all day. Highly recommended."
-John Dvorak
- San Francisco Examiner

RightWriter

It's Only $95

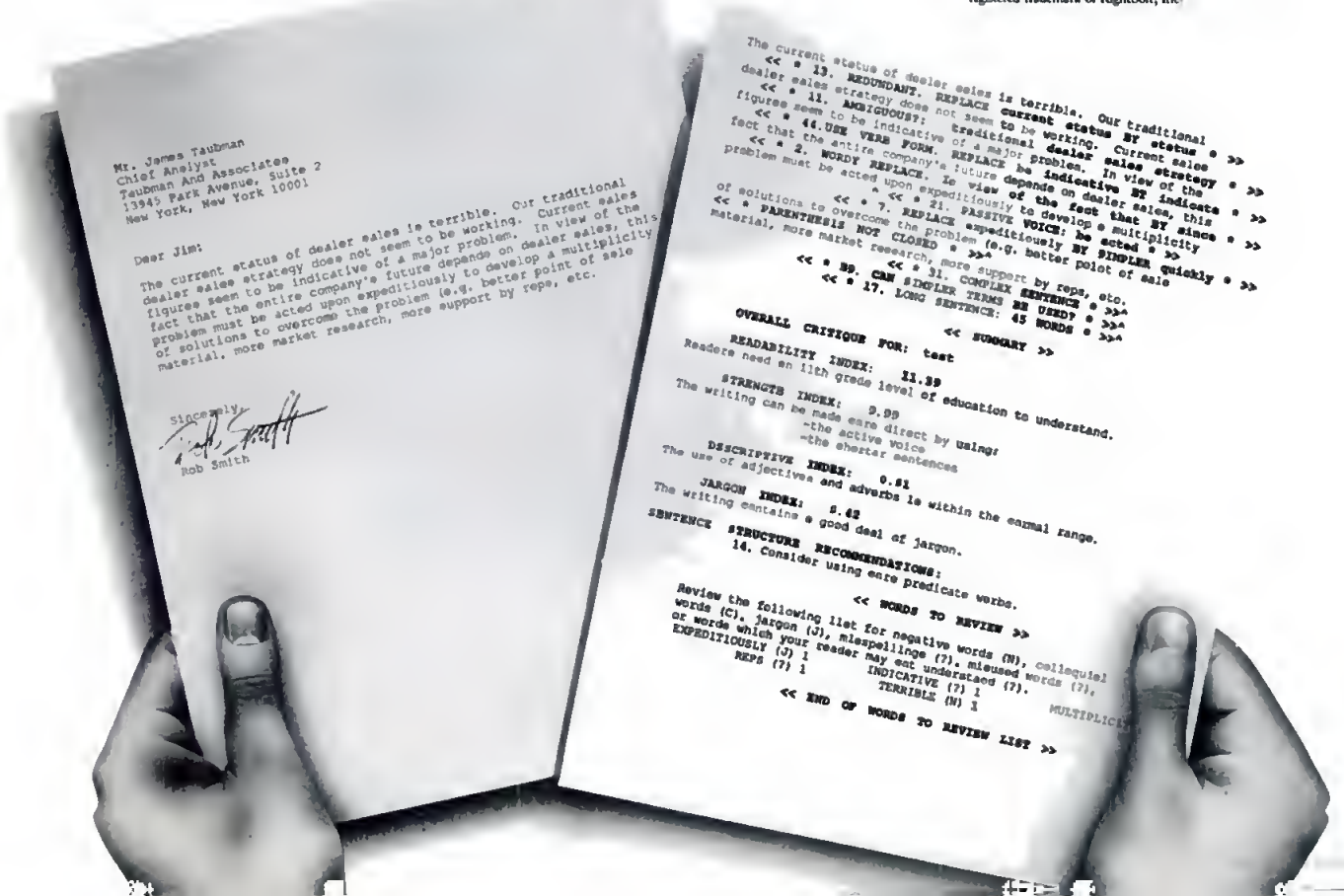
With our 30-day money back guarantee.

Ask for RightWriter at your dealer or order now by calling (800) 992-0244

CIRCLE 479 ON READER SERVICE CARD

RightSoft, Inc.

4545 Samuel Street, Sarasota, FL 34233
Phone (813) 923-0233 In Florida
Visa, Master Card, and AMEX accepted. Add $4.50 for shipping and handling. FL residents add 6% sales tax. RightWriter is available on 3½" or 5¼" diskettes. Overseas price (U.S.) $130 plus (U.S.) $15 shipping.
Copyright 1988, RightSoft, Inc.RightWriter is a registered trademark of RightSoft, Inc.



$699 Super Cartridge Squeezes 23 HP Font Cartridges into One

PC HANDS ON

BY EDWARD MENDELSON

The folks who designed Dick Tracy's ultraminiature wrist TV seem to have gone into the font-cartridge business.

IQ Engineering's $699 Super Cartridge I ($599 until September 1) shoehorns fonts from 23 Hewlett-Packard LaserJet cartridges into a single cartridge. The Super Cartridge is no bigger than the units it replaces; it's merely smarter.

The fonts look as good as Hewlett-Packard's best and, with most applications, you can plug in the Super Cartridge and start printing without fussing over printer drivers or escape codes.

The Super Cartridge I contains 55 fonts in ten different styles. In portrait mode you get Helvetica in sizes ranging from 6 to 14 point and Times Roman from 8 to 14 point. Letter Gothic ranges from 4 to 14 point. The Presentation font comes in 14- and 16-point sizes, OCR-A and Courier in 12 point, Prestige Elite (including math versions) in 7 and 10 point, Line Printer in 5 and 8.5 point, and Line Draw fonts in 12 and 14 point.

All the bold and italic variants that come in the Hewlett-Packard A through Z cartridges are included. Most of these styles are also included in landscape mode.

IQ Engineering couldn't find a way around the laws of physics or the hardware limitations of the LaserJet, so the Super Cartridge doesn't contain absolutely everything that comes in HP's cartridges. A few rarely-used landscape fonts are omitted. The crudely designed fonts in the obsolete B and F cartridges are ignored in favor of the superior versions in the "Microsoft" Z cartridge.

With most fonts you get only the standard ASCII character set, which means that you can print any character that appears on the keyboard but not the foreign-language characters that come in Hewlett-Packard's Roman-8 character set. But HP's math, legal, and line-drawing characters are fully present and accounted for.

With some effort, you can construct foreign characters using the accents and symbols that come in a special font. But for extensive foreign-language work, you're better off with the Courier font that comes with the LaserJet II or with one of HP's cartridges.

Before you join the circus-poster-and-ransom-note school of typography, keep in mind that the LaserJet lets you use only 16 fonts on a page—and two or three are plenty for good design. PC

Helvetica 8 point
Line Printer 8.5 point
Times Roman 10 point
Courier Bold 10 point
Helvetica Italic 10 point
Times Roman Bold 10 point
Prestige Elite 10 point
Helvetica 12 point
Letter Gothic Italic 12 point
Times Roman Italic 12 point
Letter Gothic 14 point
Times Roman Bold 14 point
Helvetica Bold 14 point
PRESENTATION BOLD 16 POINT

PC MAGAZINE FACT FILE

Super Cartridge I
IQ Engineering
P.O. Box 60955
Sunnyvale, CA 94086
(408) 733-1161
List Price: $699 ($599 until September 1).
Requires: HP LaserJet or compatible.
In Short: One font cartridge with the equivalent of 23 standard font cartridges.

CIRCLE 433 ON READER SERVICE CARD

A Tutorial Approach to Mastering DOS

PC BOOK REVIEW

BY GUS VENDITTO

If you're a regular reader of this magazine's Productivity columns, *Taming MS-DOS* is probably too tame for you. But it may be the book you should be recommending to less-fortunate users.

Old DOS hands who give this book and 10 minutes of their time to a rank novice can sit back and enjoy the rewards of having brought another new user into DOS adulthood—without answering questions every 20 minutes.

On the whole, the tutorials are well done and clearly explained. The book quickly moves into lessons on writing batch files that should prove rewarding to anyone willing to take the time to learn. Simple explanations of the boot sector and disk interleaves are short and to the point, and tricky concepts like ERRORLEVEL test statements are introduced and explained as they're needed.

This is far from a classic, however. It includes a hodgepodge of utilities Thom Hogan has written over the years. All of them are useful, but some, like a *WordStar* file stripper, seem to have been tossed in to fill pages. Hogan recommends that you upgrade to DOS 3.2, but includes utilities that provide functions added in DOS 3.2. He also rather glibly points his fledgling DOS users in the direction of MASM for creating DOS utilities.

If you want to turn your own system into a derivative of Hogan's, you can order a $25 disk with 21 utilities, plus the BASIC or assembler source code and a handful of batch files. All are common utilities, available more economically on public bulletin boards and PC MagNet.

Taming MS-DOS gives the effect of taking the reader on a tour of one man's approach to building a customized system. It works as a tutorial, but forget about the overpriced companion disk. PC

PC MAGAZINE FACT FILE

***Taming MS-DOS*, 2nd edition**
By Thom Hogan
M&T Books
501 Galveston Dr.
Redwood City, CA 94063
(800) 533-3271
(800) 356-2002 (in Calif.)
ISBN: 0-934375-87-9
List Price: $19.95; companion disk, $25.
In Short: A novice's guide to DOS functions and batch files.

CIRCLE 449 ON READER SERVICE CARD

New Disk Optimizer® gives you the courage to say yes!

Introducing Disk Optimizer 4.0. Now with Data Guardian™ and Undelete.

It's the moment of truth.

You've decided to erase an entire directory, and your computer asks, "Are you sure?"

Well? Are you? Is it the right directory? Will you ever want these files again?

Enter new Disk Optimizer 4.0 with Data Guardian. The only disk utility software that lets you blithely say "yes" now, and if you want, change your mind later. Because only Data Guardian ensures that anyone can *Undelete* files, directories, even entire disks. And do it hours, days, up to weeks later, no matter what else you've written to your disk in the meantime.

Best of all, Data Guardian makes file recovery quick, easy and totally foolproof. Without the complexity of other data recovery software. And without the uncertainty. Thanks to Data Guardian, Disk Optimizer comes through for you every time.

You formatted what drive?

That's fine for erased files, you say. But what happens if you accidentally format your hard disk? No problem. Disk Optimizer comes through again with *UnFormat* that can instantly restore all the data on your disk to exactly where it was before that little slip of the finger on the keyboard.

And to make sure your data is really safe, the *TrackSaver* program protects the surface of your disk from excessive wear by periodically repositioning the head on your drive when it's idle. And the *Refresh* program prevents the bad spots that develop on disks due to fading magnetic charges.

Still the safest buy in performance optimizers.

As always, Disk Optimizer also gives you the safest, most advanced performance optimization available – proven by over a quarter of a million users.

The *Optimize* program speeds up disk reading and writing times by up to 300 percent by undoing the file fragmentation that takes place naturally over time. The *DOConfig* program lets you arrange the layout of your disk for best overall performance.

And the *Analyze* program gives you a graphical look at the condition of your disk, so you'll always know when it's time to optimize again.

FREE SOFTWARE OFFER
See Page 168 for details

A total of 17 different programs.

Disk Optimizer includes *Findfile* for locating files by name or wildcard anywhere on your disk. *Sorts* for re-arranging files and directories in the way that makes sense to you. *Lock* and *Unlock* for password-protected file security. *Killfile* for erasing sensitive data permanently. And lots more.

In all, there are 17 different programs in the new Disk Optimizer. Each one designed to improve performance, guard your data, and make disk management easier and simpler for everyone.

So get new Disk Optimizer 4.0, and get more than the courage to say yes.

Get the peace of mind and total confidence that your disk is running better and safer all the time.

CIRCLE 334 ON READER SERVICE CARD

Disk Optimizer $69.95

Available at software dealers everywhere. Or order direct by calling toll-free.

SoftLogic Solutions, Inc. One Perimeter Road, Manchester, NH 03103.

Call 800-272-9900 (603-627-9900 in NH)

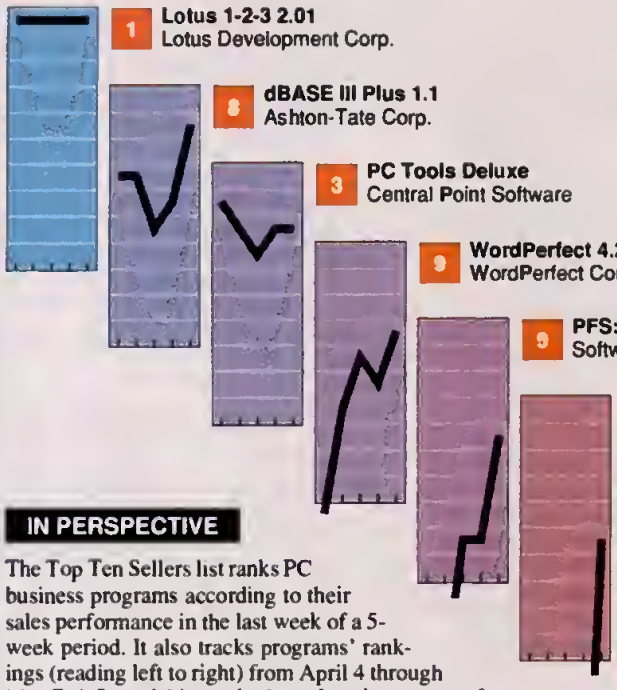
SOFTLOGIC SOLUTIONS

#6

PC MAGAZINE PIPELINE

TOP TEN SELLERS

(A 5-week history)



1 **Lotus 1-2-3 2.01**
Lotus Development Corp.

8 **dBASE III Plus 1.1**
Ashton-Tate Corp.

3 **PC Tools Deluxe**
Central Point Software

9 **WordPerfect 4.2**
WordPerfect Corp.

9 **PFS:First Publisher**
Software Publishing Corp.

3 **Dac Easy Accounting**
Dac Software Inc.

7 **Samna Word IV**
Samna Corp.

8 **Carbon Copy Plus**
Meridian Technology Inc.

9 **The Norton Utilities Advanced Edition**
Peter Norton Computing

10 **Quattro**
Borland International Inc.

IN PERSPECTIVE

The Top Ten Sellers list ranks PC business programs according to their sales performance in the last week of a 5-week period. It also tracks programs' rankings (reading left to right) from April 4 through May 7. A 5-week history is charted to give a sense of a program's sales strength over time. Dramatic shifts in a particular program's ranking may be the result of sales promotions conducted by individual retailers. Seasonal factors, such as end-of-year-budget purchase decisions, can also play a large role in the performance of a particular program in any period. More than 12,000 individual locations contribute to the list.

Rankings are based on net sales by unit; returns are subtracted from gross sales.

Sales information compiled by Ingram Software Inc.

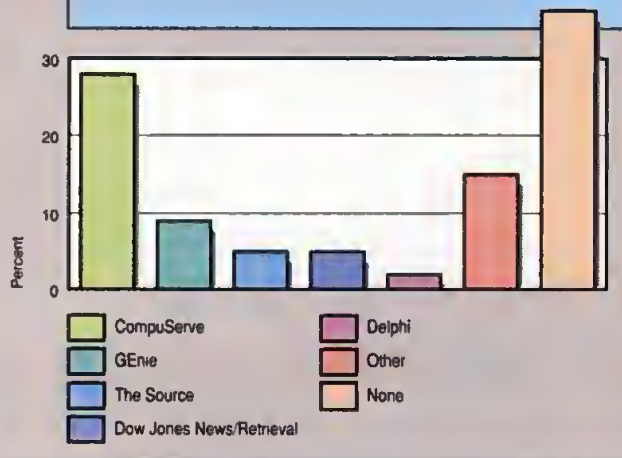
Many products that play a daily role in personal computing never get reviewed in *PC Magazine*. My fingers twinge as I write that, but it's a fact. We review every kind of software and hardware product that's available to help you get through your work, but some hardware can't be used alone and can be reviewed only within the context of a full system.

We don't review memory chips, because total system design determines how quickly your RAM can store and retrieve data.

We don't review the Phoenix and Award BIOS firmware—even though they are a crucial element in system performance—because you can't buy them for your own PC. The manufacturer of your computer had to select the best BIOS for you, and even if the company

SURVEY

Which on-line services do you use?



The gurus who told us that people would be using computers to shop from home were among the experts proven wrong in our most recent survey.

This survey was conducted on-line, so it polls only those who are already connected to on-line services, and it was conducted before the introduction of PC MagNet (see First Looks, page 46, May 31, 1988), which has attracted thousands of new users since it began on May 1.

The single most popular activity—special-interest groups—mirrors the popularity of CompuServe, home to several hundred such groups.

didn't make the right choice, there's nothing you can do about it (unless you're in the habit of burning code into ROM chips on a regular basis). Matching the right BIOS with the right PC design is a crucial decision for PC makers, but it's the finished system that has to be rated, not the BIOS.

Motherboard Choices

And we don't review motherboards (unless one was designed as an upgrade), although we'll often refer to them in reviews of systems. The performance of a particular motherboard is often the determining factor in whether one PC brand is a better buy than another. Many manufacturers rely heavily on commercially available motherboards; others, like Compaq, Tandy, and Zenith, put a lot of research into designing custom components that give their machines a competitive edge.

The most popular motherboards are sold by Intel to manufacturers. Companies like Kaypro, PC Discount, and Corvus Systems have built 386 PCs around Intel's motherboards, taking advantage of the extensive research Intel pours into these systems to ensure that they'll be compatible with the widest possible range of plug-in cards. Intel first built motherboards to test processors under development. It soon realized it had learned so much about system design and compatibility testing that a motherboard line was a natural complement to its existing businesses.

> If you want to know about the immediate future of desktop computing, you need to take a look at this behind-the-scenes product from Intel.

We won't be reviewing Intel's latest 25-MHz 386 motherboard in the magazine, but we've taken a close look at it and are already starting to review the machines it powers. In the June 14, 1988, issue (First Looks, page 46), we reviewed the CAE/SAR 386II. If you want to know about the immediate future of desktop computing, you need to take a look at this type of behind-the-scenes product.

The market is already becoming crowded with hardware makers advertising that they've broken the latest clock speed limit. What many of them have done is built a machine around Intel's SYP 302, which has these standard features: a 386 running at 25 MHz; 2MB of system RAM (expandable to 8MB); a 64K memory cache; a 220-watt power supply; two serial ports; one parallel port; seven 16-bit slots; two 32-bit memory slots; and FCC Class B certification. The I/O bus runs at 8 MHz, ensuring compatibility with the modems, network cards, and graphics adapters on the market.

Purchase the right disks and controllers, place them inside a box, plug in the keyboard, and you have got a system that is at the forefront of PC technology.

If you wanted to make a system that was a couple of million instructions per second behind today's speed leaders but $3,000 less expensive than the $6,450 SYP 302, you'd use either Intel's SYP 301 or its SYP 301Z. Both are 16-MHz 386s; the 301 executes at one wait state, and the 301Z performs at zero wait states. Of course, you can't do this on your own, unless you're willing to order several hundred boards from Intel. But you could do worse than to purchase an 80386 PC based on an Intel motherboard.

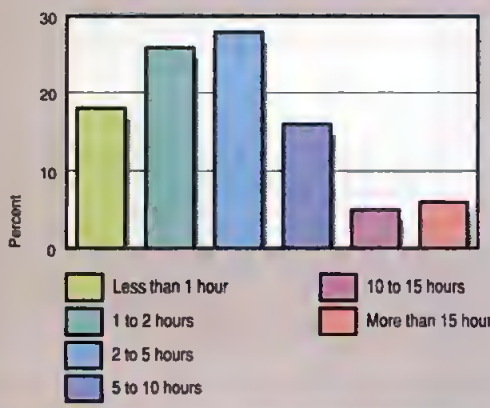
Boards That Run OS/2

Intel's compatibility testing will benefit consumers most when they're ready to boot OS/2. These boards are now running Microsoft's standard edition of OS/2. Using a nonstandard disk controller or video card could stop OS/2 before you've even completed its long-winded installation procedure, but since a majority of manufacturers use components that conform with current standards, this won't be a problem for most.

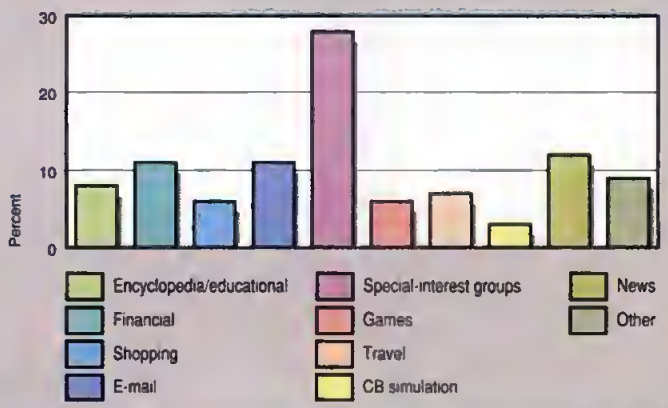
On the other hand, no OS/2 device drivers exist for some fairly popular storage devices (like Iomega's Bernoulli Box), so the OS/2-minded consumer can expect a few more gray hairs no matter which PC he decides to buy.

—Gus Venditto

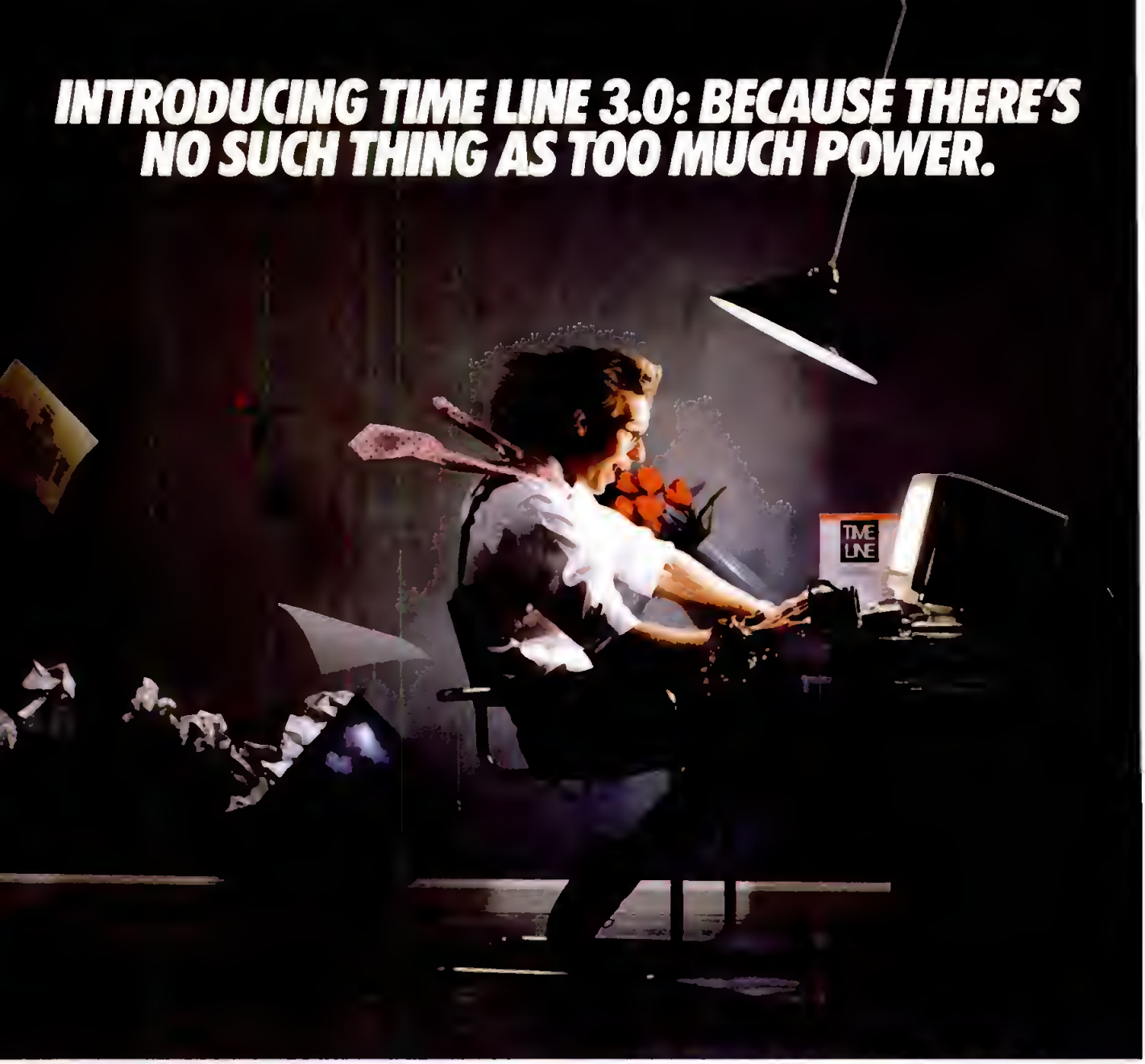
How many hours per month do you use on-line services, on average?



What kinds of services do you use?



INTRODUCING TIME LINE 3.0: BECAUSE THERE'S NO SUCH THING AS TOO MUCH POWER.



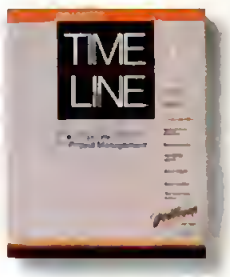
NOW THE #1 PROJECT MANAGER* PUTS EVEN MORE POWER AT YOUR FINGERTIPS.

Hold on to your personal computer. Hold on tight. Because without sacrificing Time Line's almost legendary ease of use, Time Line 3.0 just raised the standard of micro-based project management. By macro proportions. Imagine. An advanced outline structure from the company that invented outlining.† Interactive on-screen PERT. Multi-project scheduling and resource allocation without manual linking. And a customizable environment including Gantt, PERT, and reports. All this plus plenty of power features like the ones in the box. Seamlessly integrated. Easy. And only $595.

EASY, FLEXIBLE, POWERFUL PERFORMANCE:

- Unlimited level Outline Structure integrated throughout, open or close at any level.
- Interactive PERT shows hierarchy (outline) as nested boxes; open only what you need to see. Toggle between two PERT layouts to see the overall project or zoom in on specifics.
- Customizable Gantt with user-definable screen layouts. Add columns to show dates, resources, durations, costs, etc. Overlay Gantt with histograms for up to 5 resources.
- Undo or Redo up to 999 steps for "what-if" scenario analysis.
- Multi-Project Management with no linking required. Outline organizes multiple projects in a single schedule.
- Project Journal acts as outline-based scratch pad and Notes attaches reminders directly to tasks or resources.
- Baseline tracking produces Actual vs. Plan Gantt. Cost tracking records "actuals" and percent complete.
- Supports government reporting requirements (C/SSR). Calculates earned value and supports WBS and OBS numbers.
- Virtual Memory supports 1000 tasks with 640K RAM (1600 tasks with EMS extended memory).
- Customizable report generator is form driven to make it even easier.

Hundreds of enhancements, easy to navigate outlining . . . technology so advanced there are patents pending. Call (800) 888-0886 Ext. 190P for a FREE demo disk (a $9.95 value) or FREE corporate evaluation. Time Line 3.0: the power will blow you away.



The #1 Project Manager

SYMANTEC
Breakthrough software

**Time Line 2.0: PC Magazine Editor's Choice 1986 & 1987, rated #1 by Software Digest 1987. Time Line 2.0 ($495) is the best choice for laptops or PCs without hard disks or with <640K RAM. Time Line 2.0 owners call (415) 964-4430 for low cost upgrade. Training and consulting services available, call (415) 898-1919.*
† Think Tank, the original outline processor from the Living Videotext Division. © 1988 Symantec, 10201 Torre Ave., Cupertino, CA, (408) 253-9600

CIRCLE 249 ON READER SERVICE CARD

Dan Bricklin's Demo II Adds Image Capture, More Programming Power

PC HANDS ON

BY JENNIFER ZAINO

Software Garden laid in a good crop with the original *Don Bricklin's Demo Program*. Not content to let the fields lie fallow, the company has come up with a new version: *Don Bricklin's Demo II Progrom*.

Like its predecessor, *Demo II* lets you construct working program prototypes, demonstrations, and tutorials from a series of static screens, or slides. A programming language links the slides together.

Unlike the original, *Demo II* provides image capture and import features. You can now use *Demo II*'s CAPTURE utility to grab nearly any text or bit-mapped graphics screens.

With *Demo II*, you can also import text files or *PC Paintbrush* .PCX files. *Demo II* recognizes only certain types of .PCX formats, however. A handy utility helps you determine the type of your .PCX file.

You can also create your own screens or manipulate existing ones within *Demo II* itself. Screen-building features include a nice range of word-processor-like commands, including block operations.

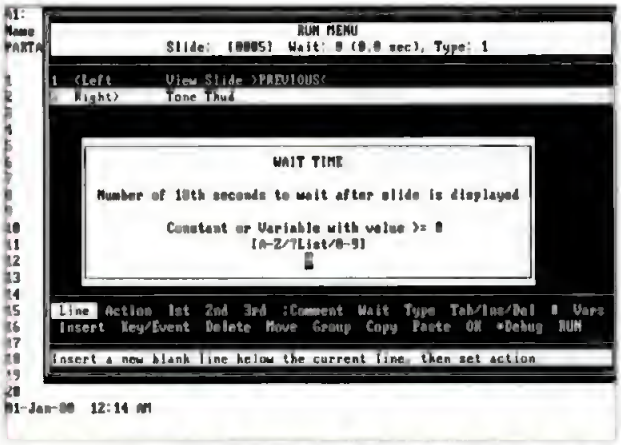
Some new Slides commands let you modify the slide switch speed and palette settings and change the switch type so that the screens move onto the display from top to bottom or vice versa.

Demo II adds about 100 new Run actions—the commands that link the slides. You can now instruct *Demo II* to flip through slides at a specified interval or to wait for user input before moving to a new slide. Run actions can apply only to specific slides or to all slides.

Both string and numeric variables are available in this version, as are several new overlay types.

Those familiar with the original *Demo* program will find the new version's manual much improved, although additional examples for the more-complex features would be a help.

A runtime-only version of *Demo II*, RDEMO2, is included at no extra cost. PC



Demo II's Run menu uses Key/Event indicators, which trigger the slide-show logic.

PC MAGAZINE FACT FILE

***Dan Bricklin's Demo II Program*, Version 2**
Software Garden Inc.
P.O. Box 373
Newton Highlands, MA 02161
(617) 332-2240
List Price: $195; upgrade, $54.95.
Requires: 512K RAM (256K for RDEMO2), one disk drive, DOS 2.0 or later
In Short: A solid program that produces program prototypes, demonstrations, and tutorials. Not copy protected.

CIRCLE 431 ON READER SERVICE CARD

CuRAM 80-8: 32-Bit Memory for PS/2 Model 80 with Modem and Port Options

PC HANDS ON

BY WINN L. ROSCH

Doing anything useful under OS/2 takes 4MB of memory. Yet the IBM PS/2 Model 80—IBM's premier engine for OS/2—ships with only 1MB, and IBM's own 32-bit memory enhancement board for the Model 80 is as hard to find as the moons of Pluto.

Enter Cumulus Corp.'s CuRAM 80-8—one of the first 32-bit memory boards for the Model 80.

The CuRAM 80-8 board avoids the use of DIP switches and jumpers by matching to SIMM type and memory capacity. It supports memory error detection and remapping, per IBM's MCA standards.

The CuRAM 80-8 also adds versatility via two optional daughtercards. You can choose a Hayes-compatible, 2,400-bit-per-second modem or a serial/parallel port combination.

The chip sockets of the CuRAM accommodate virtually anything, providing you match the byte size of the SIMMs within each bank. One bank of four 256K SIMMs gives the board its minimal 1MB endowment; two banks of four 1MB SIMMs stretches it to its maximum of 8MB.

Unbeknownst to most folks, all SIMMs are not interchangeable. Different products have different pinouts, which means they can't be plugged into most computers and expansion cards indiscriminately. But the CuRAM 80-8 automatically accommodates any standard SIMM on the market.

Cumulus also includes the necessary MCA setup software, an EMS 4.0 driver, and a print-spooling program.

The unit functioned perfectly in the 16- and 20-MHz versions of the Model 80, which have a maximum bus speed of 10 MHz. Cumulus claims the 80-8 will run at even faster rates, thanks to its ability to insert wait states automatically as a function of bus speed.

PC Labs benchmark test results put CuRAM performance on a par with that of Model 80 base memory. PC

PC MAGAZINE FACT FILE

CuRAM 80-8
Cumulus Corp.
23500 Mercantile Rd.
Cleveland, OH 44122
(216) 464-2211
List Price: With 1MB, $1,095; with 2MB, $1,495; with 4MB, $3,495; with 8MB, $5,495.
Requires: PS/2 Model 80 (16 or 20 MHz).
In Short: A full 32-bit memory expansion board for the Micro Channel. Modem or serial/parallel port can be added.

CIRCLE 430 ON READER SERVICE CARD

telemart

Doing Business Since 1980 A Division of CW Marketing, Inc.

Purchase Orders Accepted – Ask for National Accounts

Low Prices are *BORN* Here, *RAISED* Elsewhere!

FREE AIR EXPRESS SHIPPING
You Pay the Ground
We Pay the Air

SOFTWARE

SPECIAL - LOGITECH MICE

LogiMouse	Call	LogiMouse with Logi Cadd	$110
LogiMouse with Paint Show	$ 87	Logi Buss Mouse with Logi Cadd	$110
Logi Buss Mouse with Paint Show	$ 87	LogiMouse with Publisher	$110
Logi Buss Mouse with Publisher	$110		

Fox Base Plus $185 **SPECIAL** **Microsoft Word 4.0** $185

WORD PROCESSORS

Easy Extra	$ 52
Word (Microsoft)	185
Multimate Advantage II	249
PFS Professional Write	102
Volkswriter 3	132
Volkswriter Deluxe Plus	57
Webster New World Writer	53
Webster Spell Checker	32
Webster Thesaurus	37
Word Perfect	Call
Word Perfect Executive	Call
Word Perfect Library	Call
Wordstar Pro Pack 5 0	Call
Wordstar 2000 Plus Personal	205

PROJECT MANAGEMENT

Harvard Total Project Manager II	$ 309
Microsoft Project 4 0	287
Timeline 2 0	259

MONEY MANAGEMENT

Dollars & Sense w Forcast	$ 92
Tobias Managing Your Money 4 0	114

DESKTOP PUBLISHING

Newsmaster II	$ 39
Pagemaker	442
PFS First Publisher	52
Ventura Publishing	489

LANGUAGES

Basic Compiler (Microsoft)	$ 175
C Compiler (Microsoft)	259
Cobol Compiler (Microsoft)	415
Fortran Compiler (Microsoft) 4 0	259
Lattice C Compiler	229
Macro Assembler (Microsoft)	86
Pascal Compiler (Microsoft)	175
Quick Basic 4 0	57
Quick C	57
Ryan McFarlan Fortran	379
Ryan McFarlan Cobol	609
Turbo Basic	58
Turbo C	58
Turbo Pascal 4 0	58
Turbo Prolog	56
Turbo Prolog Toolbox	58

UTILITIES

1 DIR Plus	$ 46
Bookmark	56
Brooklyn Bridge	69
Carousel 2 0	43
Copy II PC	18
Copywrite	40
Corefast	89
Cruise Control	29
Cubit	Call
Disk Optimizer 2.0	Call
Disk Technician	56
Double DOS 4 0	Call
DS Back-Up Plus	46
Fastback	75
Fastback Plus	87
Homebase 2 5	40
Keyworks	53
Mace Utilities	47
Microsoft Windows 2 03	57
Norton Commander	35
Norton Editor	35
Norton Utilities 4 0	46
Note It Plus	45
PC Tools Deluxe	36
Printworks for Lasers	67
Referee	38
Sidekick Plus	Call
Sideways	37
Smart Notes	43
SQZ Plus	53
Superkey	58
Take Two MGR	66
Turbo Editor Tool Box	58
Unlock A, or B Plus	36
Unlock D Plus	49
XTree Professional	61

ACCESSORIES

Copy II Option Board Deluxe	$ 99
Masterpiece	79
Masterpiece Plus	92
Masterpiece Remote	107
MousePad by Mousetrac	9
Summasketch 12x12 Plus	359

DISKETTES

Maxell MD-2 Qty 100	$ 75
Maxell MD-2HD Qty 100	149
Sony 5¼ Qty 100	79
Sony 3½ Qty 100	119

TRAINING

Chuck Yeager Adv Flight Simulator	$ 25
Lets C	38
Mastertype	23
Mavis Beacon Typing	29
MS Learning DOS	29
MS Flight Simulator	29
PC Logo	79
Turbo Tutor 4 0	42
Typing Instructor II	27
Typing Tutor IV	27

DATA BASE MANAGEMENT

Clipper	$ 368
dBase III Plus	374
dBase III LAN	575
DB-XL Diamond	105
Eureka	88
Genifer	188
Nutshell	75
Paradox 2 0	415
PFS Professional File	119
Q & A	185
Quickcode Plus	129
Rapid File	179
Revelation	459
Revelation Bump Disk	239
R Base Clout (New Ver)	175
R Base Ext Report Writer (New Ver)	175
R Base For DOS	425
Reflex	79
VP Expert	56
VP Info	56

COMMUNICATIONS

Carbon Copy Plus	$ 105
CompuServe Subscription Kit	19
Crosstalk XVI	87
Crosstalk Mark IV	109
Mirror II	33
Remote	87
Smartcom III	136

INTEGRATIVE SOFTWARE

Ability Plus	$ 137
Enable 2 0	352
Framework II	309
MS Works	113
PFS 1st Choice	76
Smart Software System	Best Price
Symphony	435

GRAPHICS

Energraphics	$186
Freelance Plus	309
Generic CAD w Dot Plot 3 0	72
Harvard Graphics 2 1	239
In-A-Vision	259
Microsoft Chart 3 0	229
News Room	30
News Room Professional	42
Printmaster Plus	29
PrintShop	32
Turbo Graphix Tool Box	58
VP Graphix	56
Windows Draw!! w Clip Art	159

MICE

PC Mouse w/Paint (Buss or Serial)	85
PC Mouse w Autosketch (Buss or Serial)	99
Microsoft Buss Mouse 1 0	92
Microsoft Serial Mouse 1 0	92
MS Buss Mouse w CADD	107
MS Serial Mouse w CADD	107
MS Buss Mouse w Windows	122
MS Serial Mouse w Windows	122
Optimouse (PC Mouse) w Dr Halo III	82

SPREADSHEETS

Cambridge Analyst	$ 79
4 Word	55
HAL	89
Lotus 1-2-3 Ver 2 01	295
Lotus Manuscript	309
Lotus Report Writer	67
MS Excell	285
Multiplan 3 0 (Microsoft)	113
PFS Professional Plan	52
Quattro	116
Supercalc 4	269
Twin Classic	32
VP Planner	47
VP Planner Plus	82

ACCOUNTING

ACCPAC	Call
Computer Associates	Call
DAC Easy Accounting	52
DAC Easy Payroll	38
In-House Accountant	105
One Write Plus 2 0	117
One Write A R A P Payroll	117
Time Slips III	105

1-800-426-6659

ORDER LINE

MIT PC/XT TURBO
10 MHz, 640 K Memory, 150 Watt Power Supply, AT Style Keyboard, One Brand Name 360K Floppy Drive, AT-Style Case

FCC Approved
Non-Infringing Bios
All First Quality Materials
1 Year Limited Warranty
IBM Compatible

$545

Turbo PC XT w 640K & 2 Drives	$ 620
Turbo PC XT w 640K 1 Drive & 20 MG	$ 829
Turbo PC XT w 640K, 1 Drive & 30 MG	$ 855
PC 286 12 MHz Zero Wait State w 1024K, 1.2 Floppy Drive	$1159
PC 286 12 MHz Zero Wait State w 1024K 1 2 Floppy, 40 MG	$1979
PC 386 16 MHz, 1 MG RAM 1 Drive, 40 MG w EGA Card	$2479
MonGraphics Card with Parallel Printer Port	$ 55
Color Card w Parallel Printer Port	$ 55
Amber Monitor w Swivel Tilt (TTL)	$ 95
AT Multi I/O Card	$ 65
XT Multi I/O Card	$ 65
Color Monitor (RGB)	$ 255
Autoswitch EGA Card	$ 129
I/O Card (Serial/Parallel)	$ 38
I/O Card (Serial/Clock Calendar)	$ 39
Enhanced Keyboard	$ 65
1200B Modem (INT) W SW	$ 69
1200B Modem (EXT) W SW	$ 95
2400B Modem (INT) W SW	$ 155
2400B Modem (EXT) W SW	$ 175

HARDWARE

PRINTERS

Alps All models	Call
AST Turbo Lazer	$4310
C.ITOH *New*	Call
Citizen Printers	
120D	145
180D	159
MSP 40	319
MSP 45	465
MSP 50	399
MSP 55	530
Premier 35	449
Diconix 150	309
300	385
Epson Printers	Call
Hewlett-Packard	
Disk Jet	779
Lazer Jet Series II	1775
NEC	
P2200	329
850 Silent Writer	1539
P-6	418
Other Models	Call
Okidata	Call
Panasonic	
1080 I M2	165
1091 I M2	199
1092 I	325
1524	525
1592	415
1595	429
3131	325
3151	369
Lazer 4450	1635
Star Micronics	Call
Toshiba	
321 SL	485
341 SL	665
351 SX	979
Page Lazer	2415

DISK DRIVES

Bernoulli Box	
10 Meg	$ 909
20 Meg	1260
40 Meg	1605
Beta Ext	1019
Beta Int	909
Seagate	
20 MG w WD Controller	275
251-1	469
Other Models	Call
Teac	
1 2 MEG AT	89
Floppy F55 BR	79
Toshiba	
3 5 Dr 720K	95
3 5 Dr 1 4MB	125

MODEMS

Hayes	
1200	$ 280
1200B	245
2400B	385
Incomm 1200 EXT	89
1200B w soft	59
4800 w EC	289
Prometheus	
1200B w Software	75
2400B w Software	119
Other Models	Call
US Robotics	
Password 1200	149
Courier 2400	299
Courier 2400E	335

HARD CARDS

Plus 20 MG	$ 525
Plus 40 MG	659

BOARDS

AST	
Hot Shot	$ 345
Six Pack Plus	115
Xformer	545
Other Models	Call
3G+	225
ATI	
EGA Wonder	175
VIP Plus	265
Hercules	
Color Card	145
Graphics Card Plus	175
Incolor *New*	209
Intel	
Inboard 386 PC	719
Inboard 386 R w cable	979
4020	375
80287-6 *New*	175
Orchid	
Designer EGA	265
Paradise	
Autoswitch 350	130
VGA + *New*	239
VGA Professional *New*	355
Video-7	
VGA	269
Vega Deluxe	180

KEYBOARDS

Keytronica	
KB5151	$ 119
KB5153	149
KB101	79

COMPUTERS

AST	
Model 80	$1715
Model 140	2815
Model 340	4345
Model 390	5839
Other Models	Call
NEC	
Multispeed EL II	1495
Powermate	Call
Toshiba	
T-1000	785
T-1100 Supertwist	1370
T-3120	3068
T-3200	3789
T-5100	4899
Wyse	
386	2480

MONITORS

Amdek Monitors	Call
NEC	
Multisync II	$ 599
Monographic System	1259
Other Models	Call
Princeton Ultrasync	485
Samsung	Call
Sony Multiscan	535
Mitaubishi Diamond Scan	509
Zenith 1490	609

TERMINALS

Wyse	
30	285
50	355
85	425

VISA MasterCard

- **No Charge for VISA and Mastercard**
- **We Do Not Charge Your Card Until Your Order Is Shipped**
- You Pay the Ground Shipping $6 00 –
- We Pay the Air Difference
- Free Air applies ONLY to orders up to 10 lbs & Over $50
- All product carries a manufacturer's warrantee All Guarantees, rebates, trial period priviledges & promotional programs are handled by the manufacturer only

No APO, FPO, or international orders, please
Call before submitting P O & Ask for National Accounts
Personal and Company Checks Will Delay Shipping 3 weeks
Prices, Terms & Availability Subject to Change Without Notice
Add 5% for C O D Orders
We Do Not Guarantee Machine Compatibility

Mailing Address 8804 N 23rd Ave Phoenix AZ 85021

- To Place an Order 1-800-426-6659
- To Follow Up on an Order (602) 944-2552
- Order Line Hours Mon-Fri 7 00 a.m -6 00 p m Saturday 9 00 a m -1 00 p m Order Processing (602) 944-1037 10 00 a m-3 00 p m Mon -Fri

CIRCLE 206 ON READER SERVICE CARD

$95 GEM Scan: Photograph to Halftone, Includes Pixel Editing

PC HANDS ON

BY MIKE FALKNER

Nestled among the flood of new products from Digital Research is *GEM Scan*, an image-scanning program. *GEM Scan* includes both the scanning software and *GEM/3*, DRI's desktop interface.

GEM Scan installs as a standalone application or a *GEM/3* desktop program. The package supports the HP ScanJet, the Canon IX-12 Image Scanner, Princeton's The Laser Scanner Model LS-300, the AST TurboScan, and the Microtek MS-300A.

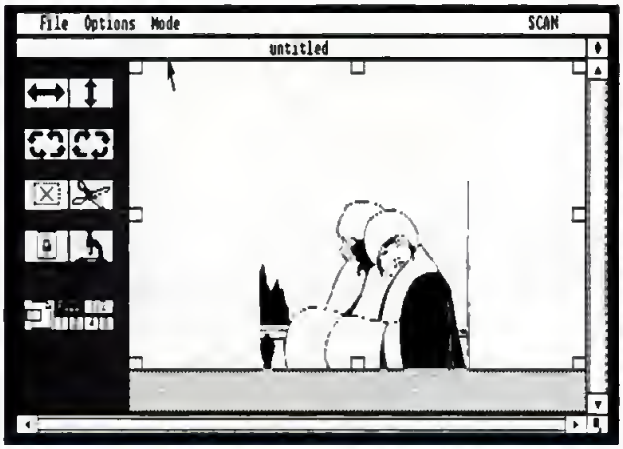
To scan an image, you simply load the picture into the scanner and click on a start-button icon. To fine tune the image, use the tool-kit to select either line art or halftones and to control the brightness. With the scaling tool you can reduce or enlarge the image.

The Options menu lets you redefine the page for smaller images and select the halftone pattern when your image is scanned. You can define two resolutions, a low one for a quick scan and a higher one to match your printer's resolution. There is also a contrast option, much like the brightness knob. With the Global option, you select the default drive, data directory, and one of two file formats, GEM's .IMG or TIFF.

To edit a scanned image, you select Edit from the Mode menu and *GEM Scan* displays a new set of tools. Using the frame in the work area, you can surround a portion of the image and rotate it left or right, flip it vertically or horizontally, or switch the dots from black to white or vice versa. With the microscope tool, you click on a small area and *GEM Scan* will blow up the image so you can edit one pixel at a time.

GEM Scan does have a few rough spots. For instance, your scanner must be hooked up to your system and turned on before you can run the program—a limitation you'll curse the first time you try to edit a scanned image on a system without a scanner. The program occasionally has problems saving TIFF files, though DRI reports that this problem is being solved.

Despite its shortcomings, *GEM Scan* is a nice addition to the GEM family of products. It scans and edits quickly and easily and produces formats usable by most popular desktop publishing packages.



The GEM Scan *image-editing tools, the icons that are at the left of the screen, include the microscope tool used for pixel-level editing.*

PC MAGAZINE FACT FILE

***GEM Scan*, Version 1.1**
Digital Research Inc.
60 Garden Ct.
Box DRI
Monterey, CA 93942
(408) 649-3896
List Price: $95
Requires: 512K RAM (640K recommended), two disk drives (hard disk recommended), one of five supported scanners, DOS 2.1 or later.
In Short: A GEM-based scanning package with a host of editing tools, image control features, and a few quirks. Not copy protected.

CIRCLE 442 ON READER SERVICE CARD

SolveIT Challenges MathCAD

PC HANDS ON

BY BARRY SIMON

Scientists and engineers often have to deal with problems that are too complex for desktop utility calculators but not demanding enough for specialized, number-crunching packages. Structured Scientific Software's *SolveIT*, like MathSoft's *MathCAD*, purports to be a scientific calculator for just such problems.

SolveIT is closely patterned after an RPN (Reverse Polish Notation) calculator but adds a host of built-in functions and some programmability.

The package's handling of complex numbers and root finding are particularly well done. It will also analyze data that you enter from the system keyboard or from an ASCII file, solve single differential equations, and handle differentiation and integration. Because you can define functions using other functions, you can also set up multiple integrals over nonrectangular regions.

There is much that *SolveIT* cannot do, however. There is no support of matrices, for example, and graphing—limited to a single function of a single variable—is displayed in CGA resolution even on an EGA or VGA system. You can print graphs only by using the PrtSc key, and then only if you have your own program that will send graphics dumps to your printer. And you can solve equations only in one variable.

In addition, the package's poor user interface makes it difficult to recommend. While some programs are faulted for making insufficient use of function keys, *SolveIT* seems to be unique in making virtually no use of the alphabet keys.

I found some of *SolveIT*'s underlying concepts especially appealing. But with its present user interface, the package is awkward to use.

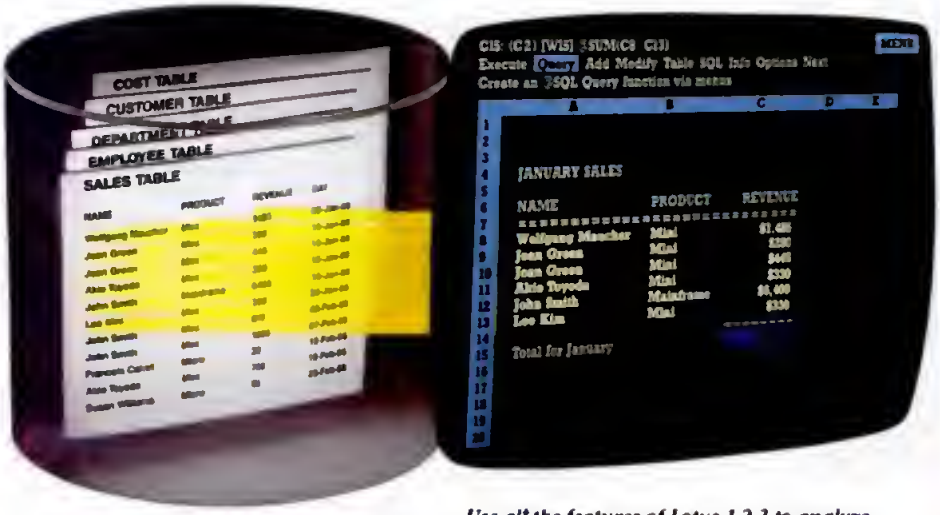
PC MAGAZINE FACT FILE

***SolveIT*, Version 3.3**
Structured Scientific Software
1509 Queen Ave., SW
Albany, OR 97321
(503) 926-8599
List Price: $129, plus $4.50 shipping and handling; with Logitech Mouse, $219.
Requires: 512K RAM, mouse; Hercules- or CGA-compatible adapter required for graph display.
In Short: A powerful scientific calculator marred by a flawed user interface. Not copy protected.

CIRCLE 432 ON READER SERVICE CARD

ORACLE® turns Lotus 1-2-3 into a full function database

ORACLE, the world's best selling relational database, now works from inside your Lotus 1-2-3 spreadsheet program. Familiar 1-2-3 menus guide you through creating, modifying and retrieving data in your database. You can even perform ORACLE database functions automatically using standard Lotus macros and formulas. The point is...



Store unlimited amounts of data in your ORACLE database

Use all the features of Lotus 1-2-3 to analyze, report, and graph data in your ORACLE database.

> *"For a price that's almost unbelievable, this add-in brings the full functionality of a powerful Structured Query Language (SQL) relational database-management system (DBMS) to the PC industry's most popular spreadsheet: Lotus 1-2-3... ...But perhaps the best news is that Oracle for 1-2-3 is very easy to learn and use. Anyone already familiar with 1-2-3 already knows how to use Oracle for 1-2-3."*
>
> *PC Week, April 5, 1988*

...If you already know how to use Lotus 1-2-3, then you already know how to use ORACLE, the world's most powerful database.

By putting data into a database, Lotus 1-2-3 spreadsheet's performance is improved, long re-calcs are eliminated and your worksheets are smaller and more manageable.

- Have ORACLE for 1-2-3 build the query automatically for you and retrieve just the data you need.
- A single command automatically creates new database tables from data in any existing worksheet.
- In update mode, changes in your worksheet become changes in your database.

And if you make a mistake, you can...

- Undo changes.

Or save your changes permanently in your database and worksheet.

- Share the same data in multiple worksheets, or even across a network of different computers with many users.

ORACLE
COMPATIBILITY • PORTABILITY • CONNECTABILITY

Call 1-800-ORACLE1, ext. 144 today.
For international pricing call (415) 506-8290

Act now, get a 30-day moneyback guarantee and we'll pay sales tax and shipping. So fill out and mail the attached coupon, or call today. You can also purchase ORACLE for 1-2-3 at your favorite computer store.

$199* *Yes, this includes the full function ORACLE database.*

Dear Oracle,

ORACLE for 1-2-3 • Oracle Corporation
20 Davis Drive • Belmont, CA 94002

Yes, I have an ☑ 80286/80386 PC running ☑ DOS 3.0+ and ☑ Lotus release 2.01 I also have ☑ 640KB of RAM, plus either ☑ 1MB of extended memory or I will reassign 1MB of my expanded memory as extended memory. Please send me the database I already know how to use — the ORACLE database add-in for Lotus 1-2-3, on ☐ 5¼" or ☐ 3½" disks. Enclosed is my ☐ check, or ☐ VISA ☐ MasterCard ☐ American Express credit card authorization for $199.*

PRINT NAME _____ DATE _____

COMPANY _____ TITLE _____

STREET (No P.O. boxes, please) _____

CITY _____ STATE and ZIP _____

PHONE _____

CREDIT CARD NUMBER _____

CARD EXPIRATION DATE _____

SIGNATURE _____ PCMAGAZINE

*Prices valid in U.S. only. © 1988 ORACLE is a registered trademark of Oracle Corporation. Lotus and 1-2-3 are trademarks of Lotus Development Corporation.

TRBA

Draw Applause: Dazzling Special Effects, Meager Import/Export and Output Support

PC HANDS ON

BY MIKE DRIPS

Draw Applause—Ashton-Tate's new presentation graphics package—seems to have been designed with one task in mind: creating slick, professional-quality 35mm slide shows. This $495 package offers a combination of ease of use and dazzling special effects that other products only dream of.

The package is divided into three sections: the Chart Window, the WordChart Window, and the Picture Window.

The Chart Window provides the tools you'll need to create a bar, pie, line, or area chart. You enter the data to be graphed at the keyboard or import .DIF or .WK1 files. You can mix chart styles and use special enhancements, such as 3-D shading.

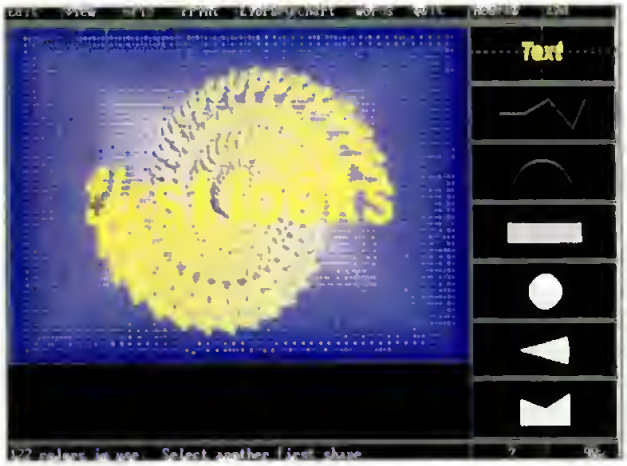
The WordChart Window provides seven templates for creating text slides. You can also create your own templates. The package offers several bullet types and a few variations of two type styles, Varitimes and Aristocrat.

After you create your graphs or text slides, you'll want to bring them into the Picture Window—the real core of *Draw Applause* and where this package really shines.

In addition to providing freehand-drawing features, the Picture Window allows you to create impressive special effects.

For instance, you can create shading and color fades using the color gradation feature. You pick a base color for the background and a second color, and the background will gradually change from the base color at the top of the screen, for instance, to the second color at the bottom. You can also create a glowing halo effect around objects or text. Other effects include spiraling text or distributed text for a coming-at-you effect.

If you'd rather tap someone else's artistic genius, you can load a choice of predesigned backdrops from the Gallery, which also includes a moderate collection of borders, symbols, and clip art. The backdrops include such effects as a line grid that appears to stretch back to a far-off horizon.



This EGA screen from Draw Applause *couples spiraled text and color gradation. You will need a PGA system to display the effects as they would appear on a slide.*

These features, and the package as a whole, prove easy and even fun to use. Unfortunately, *Draw Applause* suffers from serious shortcomings that may make prospective buyers think twice.

First, the package requires 640K RAM but supports neither extended nor expanded memory. In fact, just having the LIM 4.0 EMS driver in memory prevented *Draw Applause* from running.

My most serious complaints with *Draw Applause* center around its island-unto-itself approach, however. The package supports .DIF and .WK1 formats for data import but leaves out ASCII support. Only .CGM format is supported for graphics file import and export. At a time when most graphics packages bend over backwards to support as many formats as possible, *Draw Applause*'s sparse support is difficult to understand.

Draw Applause also gives you few options for producing your exotic color images once you've created them. The package supports only one film recorder, the Matrix Instruments PCR, and two color printers, the IBM 5182 and the Tektronix 4696. If you use a plotter, you may be in luck—the package supports a nice range of HP and IBM plotters. You'll also find a nice list of black-and-white printer support.

Perhaps even more annoying than the meager color-image output-device support is the package's seeming dependence on Ashton-Tate's own slide-production service, the Ashton-Tate Graphics Service.

You can create images on your screen that only the Ashton-Tate Graphics Service can reproduce, as indicated by the following quote from the *Draw Applause* manual: "If you select rounded corners and draw a line with more than 32 points or a free-form with more than 30 points, the shape is not displayed with rounded corners on the screen, or in plotter, printer, or film recorder output. If you send the image to Ashton-Tate Graphics Service, however, rounded corners do appear in the finished slide." Similar notices are scattered throughout the manual.

In addition, only a PGC-standard adapter and display will give you on-screen results anywhere close to the slide output. An EGA system will give you a rough idea of what to expect from a slide.

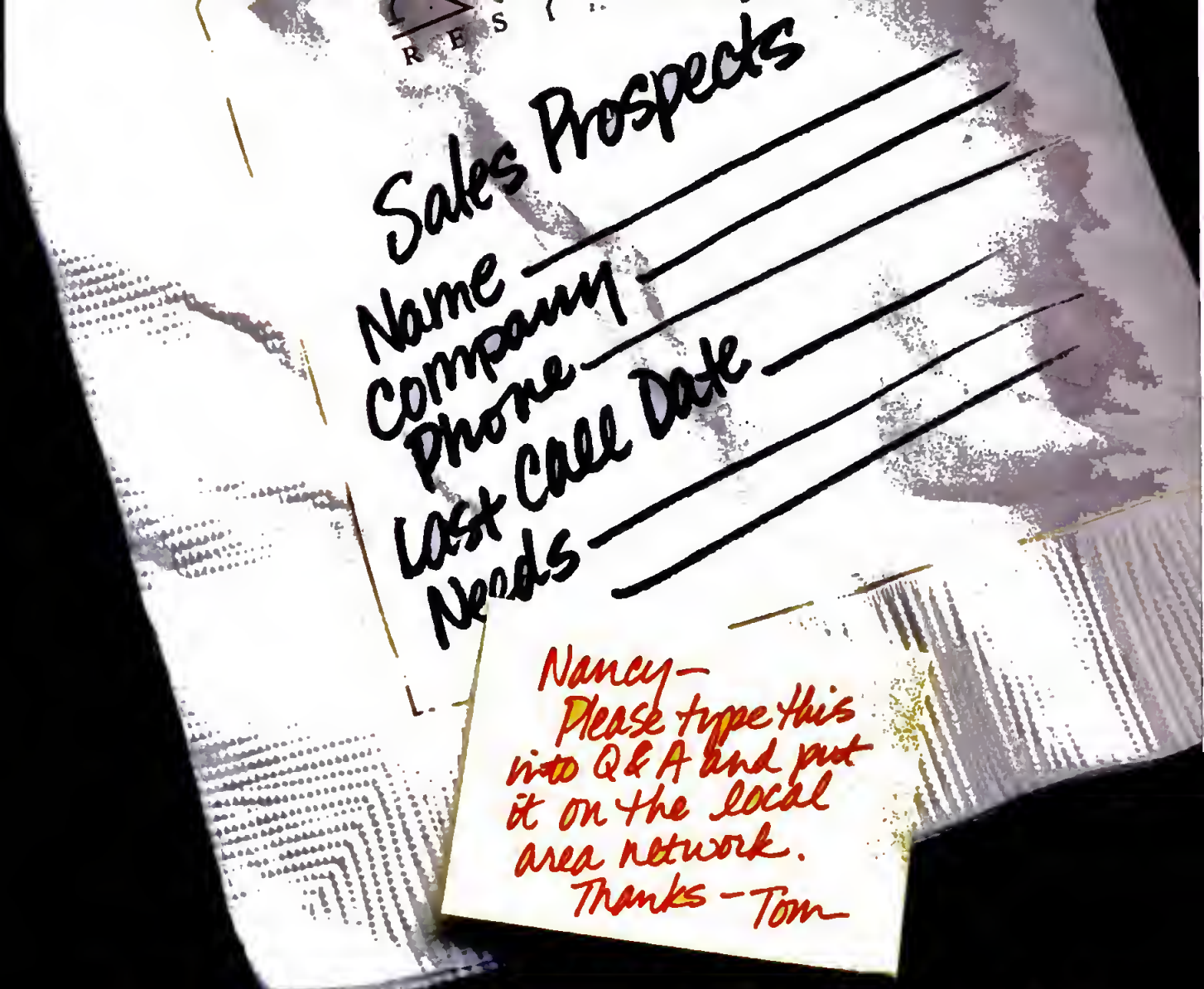
Assuming you don't mind sending your files to the Ashton-Tate service, you'll undoubtedly get excellent results. *Draw Applause* even contains communications features that let you transmit an image to the service via modem. Standard next-day service will cost you $5 per 35mm slide. The service also offers full-color transparencies, color prints, and black-and-white prints.

The bottom line? If you're looking for a package to produce quick-and-dirty graphics for in-house use, go with a product that offers more choices for importing, exporting, and producing graphs. If only the highest-quality output will do, however, *Draw Applause* may be just what you need. PC

PC MAGAZINE FACT FILE

***Draw Applause*, Version 1.0**
Ashton-Tate Corp.
25 Sylvan Rd South
Westport, CT 06880
(203) 222-1974
List Price: $495
Requires: 640K RAM; hard disk drive; EGA, PGC, or VGA display; DOS 2.1 or later.
In Short: An easy-to-use presentation graphics package capable of generating stunning color slides for professional-quality presentations. Meager import/export and output-device support may make it impractical for general use, however. Not copy protected.

CIRCLE 448 ON READER SERVICE CARD



HOW TO CREATE A RECORD-LOCKED, PASSWORD PROTECTED, MULTI-USER DATABASE IN FIVE MINUTES FLAT. FROM SCRATCH.

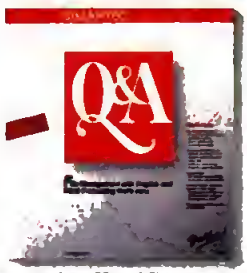
How's this for easy. Type a paper business form (or scratched out directions for one) into Q&A. Then, press a single function key and voilà. You've created a database from scratch. Copy it onto your local area network* and now everyone can search, sort, and simultaneously share it. Instantly. Easily. And safely (with up to five levels of password protection). Think of the possibilities: using a single customer database, one person is updating while another enters new information, while a third person runs a report. Or, forty people want to work on the expense database. All at once. Impossible?

This multi-user database was created (from the napkin) in under two minutes. More elaborate databases with sophisticated programming and multi-file linking, and reporting can also be created easily.

No. Easy? Yes. But find out for yourself. Call now for a free demo disk of Q&A, the world's first networked file manager. On networks or stand-alone, when you can make it from scratch, you can really cook.

PC MAGAZINE *Editor's Choice*

FREE Demo Disk, Call (800) 888-0886 Ext. 430P.



The #1 File Manager and #1 Word Processor.

SYMANTEC.™

Q&A 3.0 single user $349 (supports full record locking of databases shared on a LAN). Optional Q&A Network Pack ($299 when added to Q&A 3.0 on a LAN) allows three additional users to simultaneously operate Q&A. Add additional Q&A Network Packs for more simultaneous users. Q&A: Software Digest's #1 file manager 86,88; InfoWorld's highest rating ever given (9.6) 87. PC Magazine Editor's Choice 87,88. © 1988 Symantec, 10201 Torre Avenue, Cupertino, CA 95014 (408) 253 9600

CIRCLE 745 ON READER SERVICE CARD

Leasing Now Available

Ask about our corporate overnight replacement policy.

Leasing Now Available

If we don't have a Computer to suit your needs, you probably won't find it anywhere.

Model 386-2 16MHz

$1,795

True 32 bit Memory and Intel 32 bit tested 80386. Compare this with the competition.

- 80386 Running at 16MHz and 0 Wait State.
- 1MB of 32 Bit Ram.
- 101 Enhanced Keyboard
- Western Digital 2F-2H Controller
- 1.2MB Floppy Disk Drive
- AT and OS/2 Compatibility.
- 200 Watt Power Supply
- Socket for 80387 Coprocessor.
- 1 - 32 Bit Slot.

Model 386-6 20MHz

Truly one of the fastest 386 computers on the market. Even faster than the Compaq 386/20. Includes high speed SCSI interface on the motherboard.

- 80386 Running at 20MHz and 0 Wait State.
- 1MB of 32 Bit Ram.
- Up to 16MB of Memory on the Motherboard without using a single Slot
- Accepts 80387 Running at 20MHz.
- Accepts Wytek 20MHz Chip set.
- 101 Enhanced Keyboard.
- Western Digital Dual Floppy and Dual Hard Disk Controller.
- 1.2MB Floppy Disk Drive
- AT and OS/2 Compatibility.
- 200 Watt Power Supply.
- Tower Cases Available.

Model 386-4 16MHz

$2,195

Compaq compatible, accepts Compaq 32 Bit Cards.

- 80386 Running at 16MHz and 0 Wait State
- Speed Selectable for 4.77/6/8/16MHz
- 1MB Static Column Ram
- 101 Enhanced Keyboard
- Western Digital 2F-2H Controller
- 1.2MB Floppy Disk Drive
- AT and OS/2 Compatibility
- 200 Watt Power Supply
- 80287 or 80387 Coprocessor
- 1 - 32 Bit Slot

20MHz Model 386-5 with Intel 20MHz 80386

$2,795

Model 386-8 20MHz

$2,195

One of the lowest priced 20MHz models available.

- 80386 Running at 20MHz and 0 Wait State
- Speed Selectable for 8/16/20MHz
- 1MB of 0 Wait State Ram
- 101 Enhanced Keyboard
- Western Digital 2F-2H Controller
- 1.2MB Floppy Disk Drive
- AT and OS/2 Compatibility
- 200 Watt Power Supply
- 80287 or 80387 Coprocessor
- 1 - 32 Bit Slot

Model 286-1 12MHz

$1,095

Nearly as fast as many 386 computers.

- 80286 Running at 12MHz and 0 Wait State
- Speed Selectable for 6/12MHz
- 512K of 60NS Ram
- Up to 1MB on the Motherboard
- 101 Enhanced Keyboard
- Western Digital 2F-2H Controller
- 1.2MB Floppy Disk Drive
- AT and OS/2 Compatibility
- 200 Watt Power Supply
- Socket for 80287 Coprocessor

Model 386-7 24MHz

$2,795

- 80386 Running at 20/24MHz and 0 Wait State.
- 1MB of 0 Wait State Ram
- Up to 16MB available
- 101 Enhanced Keyboard
- Western Digital 2F-2H Controller
- 1.2MB Floppy Disk Drive
- AT and OS/2 Compatibility
- 200 Watt Power Supply
- 2 - 32 Bit Slots.
- 1 Parallel and 2 Serial ports.

386 and 286 Portables with Gas Plasma screen in 640 by 400 resolution. Call for pricing on both 386 and 286 models.

DEALERS

Competitive Motherboard Pricing

24MHz-386	20MHz-386	16MHz-386
$1,695	$1,395	$1,125

All prices for quantity 10 and include 1MB of RAM

Hauppauge replacement boards for AT's, XT's, and PC's. Always in stock. Call for pricing.

800-338-2446

in N.J. Call (201)-891-3002

Custom designs to meet your specific requirements.

All hardware has a 30 day money back guarantee and a 1 year warranty on parts and labor. All computer systems are assembled in the USA, burned in, and fully tested before being shipped.

Master Card, Visa, American Express, and COD's accepted. Leasing available with one dollar or 10% buy out at the customer's option.

All prices subject to change without notice. AT, XT, PS/2, and Micro Channel are trademarks of International Business Machines Corp. OS/2 is a trademark of Microsoft Corp. Compaq is a trademark of Compaq Corp.

CIRCLE 390 ON READER SERVICE CARD

NEW ON THE MARKET

by Michael W. Muchmore

Everex and ALR Unveil Their Speediest PCs: The 25-MHz 80386s

Rising clock speeds and ever-more-sophisticated memory caches have prompted several manufacturers to insist that their 80386 machines are the fastest to be found.

The Step 386/25, a 25-MHz 80386-based PC, has a scalable memory-caching scheme previously found only on mainframes, according to **Everex Computer Systems Division**. The Advanced Memory Management Architecture wrings a 6-mips performance from the 80386, Everex says.

The Step 386/25 comes with 1MB of zero-wait-state memory, which can be increased to 16MB. Also standard is a 1:1 interleave hard-and-floppy disk controller, a 101-key board, five drive bays, math coprocessor support, and MS-DOS 3.3. The machine is Novell, Unix, and Xenix compatible as well.

Meanwhile, **ALR (Advanced Logic Research)** of Irvine, California, claims *its* 25-MHz system is the world's fastest microcomputer. The FlexCache 25386 uses proprietary 64K 82385 cache emulation and zero wait states, ALR says. The standard 1MB RAM can be increased to 14MB without resetting switches.

The 25386 uses an ESDI controller with 1:1 interleave and full-track buffering for the 150MB ($9,499) and 300MB ($12,499) hard disk versions.

The floor-standing system box accommodates up to two full-height hard disks and three half-height devices.

One 1.2MB 5¼-inch floppy disk drive, 80387 support, and one serial and one parallel port are standard.

Advanced Logic Research's $9,499 FlexCache 25386 runs at 25 MHz

List Price: Everex Step 386/25, call company. Everex Computer Systems Division, 48431 Milmont Dr., Fremont, CA 94538; (800) 356-4283.

CIRCLE **437** ON READER SERVICE CARD

List Price: ALR FlexCache 25386, with 150MB hard disk, $9,499, with 300MB hard disk, $12,499. Advanced Logic Research Inc., 10 Chrysler, Irvine, CA 92718; (714) 581-6770.

CIRCLE **438** ON READER SERVICE CARD

Two Hand-held Scanners Enter the Market: Logitech ScanMan and Mitsubishi MH 216

Hand-held scanners from **Logitech** and **Mitsubishi Electronics America** join Saba's entry in an increasingly crowded field.

Logitech, of Fremont, California, has announced the $299 ScanMan, a hand-held scanner, along with scanning software called *ScanWare*. *WinScan*, a utility for scanning images directly into a *Microsoft Windows* clipboard, is also included with the scanner.

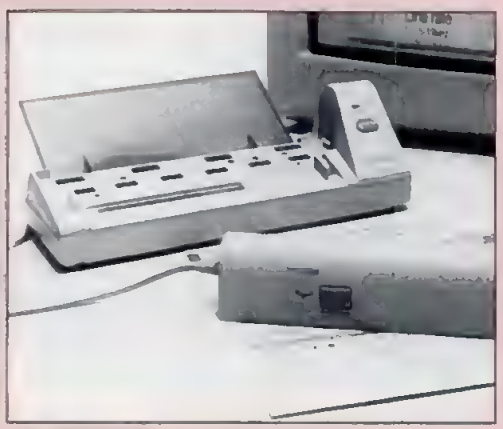
The ScanMan offers 200-dot-per-inch resolution along a 4-inch scanning width. It can scan in this width for 11 inches.

Scanned images can go directly to a TIFF file, into a *Windows* clipboard using *WinScan*, or into an included graphics editor. The graphics editor can resize, cut and paste, color, rotate, insert, and magnify scanned images.

Mitsubishi's 8½-inch-wide hand-held scanner can attach to a paper feeder to emulate a flatbed or sheet-feed scanner. The $995 MH 216 scans 16 gray shades at 200 dpi at a rate of 10 seconds per page.

A contact-type charged-couple device (CCD) speeds scanning, and rotary encoders are used to cope with speed changes in manual scanning, Mitsubishi reports. Two sets of rollers keep hand-scanning motion in a straight direction.

Images from both company's scanners are usable in such applications as Aldus's *PageMaker*, *Ventura Publisher*, *PFS:First Publisher*, and Z-Soft's *PC Paintbrush*.



The $995 Mitsubishi MH 216 scanner is 8½ inches wide, scans 200 dots per inch, and can attach to the MH01FA, an automatic paper feeder that lets it emulate either a flatbed or a sheet-feed scanner.

The ScanMan scans 200 dots per inch and comes with ScanWare software and a WinScan utility that allows you to scan directly to Windows.

List Price: ScanMan, $299.
Requires: *ScanWare*: 640K RAM, hard disk, DOS 2.0 or later; mouse recommended. Not copy protected. Logitech Inc., 6505 Kaiser Dr., Fremont, CA 94555; (415) 795-8500.

CIRCLE **439** ON READER SERVICE CARD

List Price: Mitsubishi MH 216, $995; MH01FA sheet feeder, $260
Requires: Software: 640K RAM, hard disk, DOS 2.1 or later. Not copy protected. Mitsubishi Electronics America, Computer Peripherals Division, 991 Knox St., Torrance, CA 90502; (213) 515-3993.

CIRCLE **440** ON READER SERVICE CARD

MicroDirect Complete Portable Office Joins Laptop, Cellular Phone

If you need to communicate with your office PC from a location with no power source and no telephone line, you can use the Complete Portable Office (CPO), from **MicroDirect**, of Everett, Massachusetts.

The CPO is based on MicroDirect's Turbo Laptop computer and a Panasonic cellular phone. A modem, a modem/cellular interface, and the 3-pound Diconix laptop printer round out the $4,995 system. For $5,500 you get a 20MB hard disk drive in the laptop.

The Far East–built Turbo Laptop has an 80C88 microprocessor and 1 MB RAM (640K for DOS and 384K of EMS memory). An 80-column, 640 by 200 backlit supertwist blue/green liquid crystal display is standard.

(continues on page 52)

NEW ON THE MARKET

HOT PROSPECT

Mitsubishi Challenges Toshiba T3100 with Big-Screen MP286L

Posing a challenge to Toshiba and other laptop producers, **Mitsubishi Electronics America** claims that its MP286L laptops have the largest, most readable displays of any portable computer.

The 11-inch cold cathode-ray tube (CCT) screens show black characters or graphics on a white background. Screen colors can be reversed with the flip of a switch. Neutral twisted nematic (NTN) technology makes the display readable in all light conditions, according to Mitsubishi.

A built-in CGA controller can support an external monitor as well as the page-white display. Mitsubishi says that EGA will be available in the fourth quarter of 1988.

Though Mitsubishi labels the 15.9-pound machines as laptops, the systems require an AC plug or a third-party external battery pack. The sleek black chassis measures 12.3 by 14.2 by 3.5 inches.

The laptops run an Intel 80286 microprocessor at either 8 or 12 MHz, and an 80287-8 coprocessor is optional. The MP286L comes with 640K RAM, expandable to 2.64MB.

There are four proprietary expansion slots, one parallel and two serial ports, and a clock calendar.

A dual 3½-inch disk drive configuration ($3,195) and a 20MB hard disk configuration ($3,995) are available.

The U.S.-assembled lunchbox computer has standard a 78-key keyboard, with twelve function keys across the top and cursor keys at the top right.

Hardware options include a 2,400-bit-per-second modem, an external 3½-inch floppy disk drive, and a 17-key numeric keypad.

Both DOS 3.3 and GW-BASIC 3.2 are standard; OS/2 is optional.

List Price: Mitsubishi MP286L, with two floppy disk drives, $3,195; with 20MB hard disk, $3,995. Mitsubishi Electronics America, Computer Peripherals Division, 991 Knox St., Torrance, CA 90502; (213) 515-3993.

CIRCLE **436** ON READER SERVICE CARD

Mitsubishi says its $3,195 MP286L portable computer has the largest, most readable screen in its class. The computer has an 80286 microprocessor running at 12 MHz.

MicroDirect's $4,995-to-$5,500 CPO (Complete Portable Office) comprises a laptop computer, modem, cellular phone, adapter, and printer.

MicroDirect

(continued from page 51)

The built-in Hayes-compatible modem transmits at 1,200 bits per second using Bell or CCITT standards. A telcon connector on the side of the laptop connects the PC to a cellular phone adapter, or a telset connector can be used with a regular phone.

List Price: MicroDirect Complete Portable Office, $4,995; with 20MB hard disk, $5,500. Turbo Laptop alone, $1,895; with 20MB hard disk, $2,795. MicroDirect Inc., 2010 Revere Beach Pkwy., P.O. Box 835, Everett, MA 02149; (617) 387-2200.

CIRCLE **441** ON READER SERVICE CARD

Keyboard Doubles as Diskless LAN Station

It looks like an obese 101-key keyboard, but PC Office's NT-10 is actually a 16-bit computer, complete with an 80C86 processor. The diskless NT-10 is compatible with NetBIOS LANs, Novell's *NetWare*, and twisted-pair LANs.

PC Office says the company was able to fit a networking system unit in a keyboard by putting all network hardware on a single custom integrated circuit that combines the functions of 35 ICs. The result is circuitry that generates very little heat, obviating the need for a fan.

The $995 workstation can be purchased with 0K, 512K, or 1MB RAM (with support for LIM 4.0 expanded memory) installed, and it accepts standard SIMMs. On the back of the unit are CGA, monochrome, and Hercules connectors (selectable by switch); LAN connections; parallel and serial ports; and a 10-watt power input for use with an included transformer.

List Price: PC Office NT-10, with 512K, $995. PC Office, 4631 Viewridge Ave., San Diego, CA 92123; (619) 268-3235.

CIRCLE **443** ON READER SERVICE CARD

The NT-10 from PC Office is more than a keyboard: it's a $995 intelligent LAN workstation featuring an 80C86 microprocessor.

FASTMICRO

ORDER LINE: 1-800-441-FAST

COMPUTERS

Avantage286

10 Mhz-0 Wait
Norton SI = 11.5

$969 Complete

Base System Includes 512K, 1.2MB Floppy Drive, Dual Speed (6 & 10Mhz) 80286, 8 Expansion Slots, Monochrome Graphics Adaptor, TTL High-Res Tilt & Swivel **Amber Monitor**, Parallel Printer Port, 200W Power Supply, Clock/Calendar, Enhanced AT-Style Keyboard and Learning Software.

Base System With 20MB 28ms Seagate Hard Disk **$1249**

Base System With **40MB** 40ms Seagate Hard Disk **$1399**

All Systems Come With A One-Year Warranty

Color System Add: $200

Avantage88

8 Mhz 8088
Our Prices Include Monitor!

$599 Complete

Base System Includes 640K, 360K Floppy Drive, Dual Speed (4.77 & 8 Mhz) 8088, Monochrome Graphics Adaptor, TTL High-Res **Amber Monitor**, 150W Power Supply, Parallel Printer Port, AT-Style Keyboard and Learning Software.

CALL FOR UP TO THE MINUTE PRICING

Base System With 20MB Seagate Hard Disk **$849**

Base System With **30MB** Seagate Hard Disk **$899**

Special! Quattro $119

EGA System Add: $400

HARDWARE

PRINTERS	LIST	FAST
Brother		
M1709	599	429
Citizen		
120O	229	145
180D	259	165
MSP40-55		Call
Tribute 124	699	449
Tribute 224	949	599
Diconix		
150P	499	307
Epson		Call
Fujitsu		
OL3400	995	549
NEC		
P2200	499	329
P5XL	1295	Call
P5200	899	Call
P5300	995	Call
LC890	4799	Call
Okidata		Call
Panasonic		
KXP1080i-2	299	169
KXP1091i-2	329	195
KXP1595	749	Call
KXP1524	949	Call
Star		
NX1000	289	179
NX15	499	299
NB2410	699	449
Toshiba		
P321SL	749	497
P341SL	999	655
P351SX	1499	899

BOARDS	LIST	FAST
AST		Call
ATI		
VIP VGA	449	259
Chicony Keyboards		
5060 84 Key	79	49
5161 Tactile	99	65
Everex		
1200B Int Modem	149	73
2400B Int Modem	249	149
Genoa		
Super EGA Hi-Res+	399	179
Super VGA Hi-Res		Call
Hercules		
Graphic Card +	299	173
VGA	399	249
Intel		
8087-2	250	149
80287-8	410	249
80287-10	480	287
Above Board 286	645	349
Inboard 386 1mb	995	749
Orchid		
Designer VGA	445	269
Tiny Turbo 286	445	269
Twin Turbo 12mhz	645	379
Paradise		
Basic EGA	199	119
Autoswitch 480	349	149
VGA Plus	399	235
5 Pack 0K	129	59

	LIST	FAST
Prometheus		
Promodem 1200B	119	75
Promodem 2400B	199	119
Promodem 2400G	249	159
Quadram		Call
Std. Microsystems		
PC110	295	149
PC210	335	199
PS110	695	499
Video 7		
Vega Deluxe	379	179
Vega VGA	499	269
LAPTOPS		
NEC		
Multispeed	1995	1199
Multispeed EL II	2295	1449
Multispeed HD	3695	2295
Sharp		Call
Toshiba		
T1000	1199	749
T1200F	2399	1495
T1200H	3499	2195
T3100/20	4699	Call
Zenith		Call
FACSIMILE		
Bell Office 71001	2099	1399
Toshiba		
30100	1795	1249
3700	2495	1899
Panasonic FXBM89	999	659
Sharp UX-140	1499	999

DISK DRIVES	LIST	FAST
Fujitsu		
360K Floppy	119	77
Miniscribe		
40MB AT #3650	499	299
40MB XT #3650	599	379
Mitsubishi		
360K Floppy	149	79
1.2MB Floppy	199	99
720K 3.5" Floppy	199	99
Priem		Call
Seagate		
20MB XT Kit #225	599	267
30MB XT Kit #238	699	297
30MB AT #138	599	339
40MB AT #251	899	449
MONITORS		
Amdek		
1280	999	669
310A	230	99
732 VGA	625	399
Magnavox		Call
Mitsubishi		
1409 RGB	399	259
1410 EGA	599	399
Diamond Scan	799	485
NEC		
Multisync II	899	589
Multisync GS	279	189
Princeton		
Ultrasync	849	525
Thompson		Call
Zenith 1490	999	595

Call On Non-Listed Items

SOFTWARE

Database	LIST	FAST
Clipper	699	359
dBase III+	699	359
dBXL	199	109
Foxbase Plus	395	189
Paradox	725	419
Quartz	795	449
RapidFile	295	169
Rbase for DOS	700	429
Reflex	150	84
Q & A	349	179
Desktop Publishing		
Byline	295	175
GEM Desktop Pub.	299	169
Pagemaker		Call
PFS:First Publisher	99	55
Publisher's Paintbrush	285	149
Ventura	895	459
Financial		
Computer Associates		Call
DAC 2.0	99	59
DAC P/R	89	39
Dollars & Sense	179	99
In-House Accountant	99	59
Managing Your Money	199	117
Peachtree Complete	199	149

Special! Quattro $119

Graphics	LIST	FAST
Boeing Graph	395	199
Deluxe Paint II	105	87
Draw Applause	495	269
Freelance Plus	495	299
GEM Draw Plus	299	165
Generic CAOD	99	57
Harvard Graphics	495	Call
PrintMaster Plus	60	30
Integrated		
Ability Plus	259	149
First Choice	149	77
Smart System	895	427
Works	199	117
Windows	99	59
Windows 386	195	117
WordPerfect Exec	249	117
Mice/Accessories		
Logitech C7 Serial/Bus	119	87
Logitech HiRes	150	87
Microsoft Serial/Bus	150	97
PC Mouse	149	89
Datasheild 85	90	50
Datasheild 100	99	57

Programming		
Macro Assembler	150	89
Norton Guides	100	58
Turbo Basic	99	58
Turbo C	99	58
Turbo Pascal	99	58
Quick Basic	99	59
Quick C	99	59
Spreadsheets		
Excel	495	Call
Lotus	495	Call
PFS: Pro Plan	99	51
Plan Perfect	395	167
Quattro	248	**119**
Worksheet Utilities	100	59
Utilities		
CoreFast	149	87
Desklink	170	95
Formtool	95	54
Laplink	130	75
Norton Advanced	149	74
PC Tools Deluxe	80	36
Sidekick Plus	195	119
XTree	70	34

Word Processors		
4Word	100	55
Easy Extre	99	55
GEM First Word Plus	199	117
Manuscript		Call
Multimate Adv. II	565	247
Professionel Write	199	105
Sprint	195	139
Q & A Write	199	119
Volkswriter	295	Call
Webster's Writer	100	54
Word	450	Call
Word Perfect	495	189
Word Perfect Library	129	54
WordStar	350	Call

Call On Non-Listed Items

TERMS: No Charge for Visa or MasterCard. Shipping Charge 3% (Min. $4). Product warranties & claims are handled by manufacturer. All returns are subject to 15% restocking fee, call for RA. COD's add 5%, restrictions apply. Personal/company checks delay shipping. Compatibility not guaranteed (except on Avantage). Prices/availability subject to change. AZ orders add 6.5% tax. For your protection we check for stolen credit cards.

Mailing Address:
3415 S. McClintock Dr., Tempe, AZ 85282
Order Processing/Technical Q's: 602-437-8975

CIRCLE 352 ON READER SERVICE CARD

Northgate Power 386: Premium Performance at a Bargain Price

HANDS ON

BY BILL O'BRIEN

Field-leading 386 performance just got cheaper. Northgate Computer Systems' Power 386 rivals the power of the Compaq Deskpro 386/20 at a fraction of the cost.

The Power 386 is an upright, 20-MHz floor model with a base price of $4,295—including a high-performance 65MB hard disk.

A 64K static RAM memory cache deserves much of the credit for the Power 386's performance. Like the Deskpro 386/20, the Power 386 maintains a high-speed, 32-bit path to memory, separate from the I/O bus.

Whereas the 386/20 makes use of Intel's sophisticated cache controller chip, however, the Power 386 falls back on a direct-map static RAM system composed of discrete logic components. Compaq's solution no doubt earns it memory access performance gains in some cases, but the Power 386 won't be far behind.

Northgate's Power 386 sports power and reset switches at the top, along with a disk activity light. Inside are eight slots.

The hard disk drive does not have an overly spectacular track-to-track access time—28 milliseconds—but that is a mechanical measurement of disk capability. Data throughput, the speed at which the information is actually passed across the bus and the more important measure of performance, rates as spectacular when hard disk caching is enabled. But even without caching, the large- and small-record times for the PC Labs benchmark tests rank the Power 386 machine right up there with the Compaq Deskpro 386/20.

The standard configuration includes a 14-inch monochrome monitor, one 5¼-inch 1.2MB floppy disk drive, and one 3½-inch 1.44MB floppy drive. That leaves you with one empty half-height bay.

Whether you purchase this 386-based machine for its price tag or for its performance, the chances are that you won't be disappointed. Watch *Microsoft Windows* load quickly for a change, or observe a pull-down menu snap up like a runaway window shade, and you will finally get an honest feel of what speed is all about.

FACT FILE

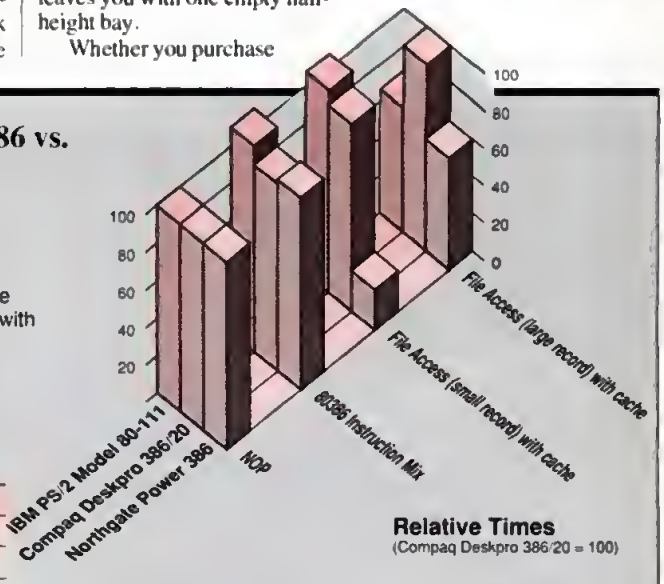
Northgate Power 386
Northgate Computer Systems
13895 Industrial Park Blvd., #110
Plymouth, MN 55441
(612) 553-0111
List Price: With 1MB DRAM, 64K SRAM cache, one 5¼-inch 1.2MB floppy disk drive, one 3½-inch 1.44MB floppy disk drive, 65MB hard disk, monochrome monitor, $4,295.
In Short: The Power 386 delivers top performance and intelligent design at an excellent price.

CIRCLE 447 ON READER SERVICE CARD

Benchmark Tests: Northgate Power 386 vs. Compaq Deskpro 386/20 and IBM PS/2 Model 80-111

The Northgate Power 386 holds its own against even the Compaq Deskpro 386/20 in every performance category. Despite a mediocre 27-millisecond random access speed for the hard disk, the hard disk throughput was especially impressive—with or without the disk cache invoked.

Performance Times (Times given in seconds)	NOP	80386 Instruction Mix	File Access (small record with cache)	File Access (large record with cache)
IBM PS/2 Model 80-111	1.65	3.20	36.79	6.20
Compaq Deskpro 386/20	1.65	2.90	34.14	9.34
Northgate Power 386	1.65	2.96	7.41	5.59



The **NOP** benchmark test is designed to measure raw clock speed and memory access time while minimizing differences in microprocessors and the affect of memory caching. This test executes almost nothing but NOP ("No Operation") machine code instruction in a big 128K loop.

The **80386 Instruction Mix** benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 80386 instruction code. These instructions are a subset of the total processor instruction set. The 80386 Instruction Mix implements a number of 32-bit operations. In the 80386 processor these become single instructions, whereas in the 8086 and 80286 versions of the benchmark test they remain multiple instructions.

The **File Access** benchmark test measures the time it takes to perform a series of disk operations: a sequential create and write of a 256K data file; a sequential read of the same file; a random write; and a random read. The first set of results reports the time required to perform the test using record lengths of 512 bytes and 4K. The second set of results is the time required to perform the same test using 16K and 32K records. The larger record sizes show how a disk will perform in loading large programs and loading and saving large data files. Higher-throughput systems such as RLL drives will show better performance in the large record test.

"Within a few days, SideKick *Plus* became even more indispensable than SideKick"

Dick Pountain, Personal Computer World

Here's what Personal Computer World had to say about SideKick® Plus:

"When the news of SideKick Plus arrived, I made up a shopping list of the improvements I would like to see ... Borland has provided all these things and much, much more."

Intelligence and elegance of design

"I discovered that the same intelligence and elegance of design that initially attracted me are still there, and certain new features like the customizable menu system represent a real breakthrough in user interface design."

Sophisticated memory management

"Memory management in SideKick Plus is so sophisticated that it almost amounts to an alternative operating system ... The amount of memory tied up is tiny (less in fact than old SideKick!) ... "

The Phonebook: Fully-featured communications

"The Phonebook has come a long way ... For one thing, it has acquired a fully featured communications package which can work in the background; you can upload and download files while continuing to work on your PC ... The Script language is one of the best I have seen."

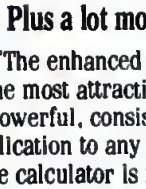
The Notepad: Power for serious writing

"The Notepad is as powerful as many word processors ... I would happily use it for serious writing." "Up to nine notepads can be opened simultaneously with SideKick Plus."

Outlook: The best outline processor

"Outlook is ... the best outline processor I've tried, comfortably beating ThinkTank, PC-Outline, and Ready! in elegance and ease of use."

3½" and 5¼" disks included.
Hard disk required.



The File Manager: Competing with the standalones

"The File Manager ... performs a similar function to standalone utilities like Xtree, Quick DOS, or the Norton Commander, and shares features with all of them."

The Time Planner: Hugely enhanced

"The Time Planner has advanced even further than the Phonebook ... it has been designed with networking in mind."

Plus a lot more

"The enhanced cut-and-paste functions are perhaps the most attractive feature of SideKick Plus ... [it] has a powerful, consistent ability to cut-and-paste from any application to any other."
"The calculator is no longer one, but four calculators; you can switch the type to Business, Scientific, Programmer, or Formula."

Positively addicting!

"In my view, the individual applications in SideKick Plus are of such a standard that I would be hard put to better them with a collection of standalone applications ... I remain an addict."

Excerpts from Dick Pountain's review of SideKick Plus in Personal Computer World, March 1988.

If you have the Intel® Above™Board you can load the SideKick Plus desk accessories into expanded or extended memory and leave most of your conventional memory to run your other applications.

Ask your dealer about Borland's special offer for SideKick owners.

*60-Day Money-Back Guarantee**

BORLAND INTERNATIONAL

For the dealer nearest you or a brochure, call (800) 543-7543

For the IBM PS/2™ and the IBM® family of personal computers and all 100% compatibles.

*Customer satisfaction is our main concern. If within 60 days of purchase this product does not perform in accordance with our claims, call our customer service department, and we will arrange a refund.

All Borland products are trademarks or registered trademarks of Borland International, Inc. Above Board is a trademark of Intel Corp. Other brand and product names are trademarks of their respective holders.
Copyright ©1988 Borland International, Inc.

BI 1227

CIRCLE 137 ON READER SERVICE CARD

Tree86: Mouse-Minded Hard Disk Organizer

PC HANDS ON

BY EDWARD L. PERRATORE

It isn't easy to top *X-Tree Pro* for a good, sleek hard disk manager. But if you want to cut costs, give your mouse some exercise, and pick up a few more features, *Tree86*, Version 2.0, is worth the climb.

At $89, The Aldridge Co.'s *Tree86* first shows a graphic-tree display of subdirectories. Pull-down menus offer DOS commands plus a few additions.

You drag the mouse to undrape various menus and then click options. A mouse isn't mandatory, but mouse support is one of *Tree86*'s best selling points.

Tree86 helps you find files using up to four parameters. You can sort files by several criteria and then reverse the order. While pointing and shooting to copy, tag, and move files, you can also view chained files by using VIEW-86.EXE.

Along with routine DOS functions, Tree86's Xcopy copies whole directories.

The Xcopy option copies files, directory structure and all, between drives. Hitting " / " toggles you into TreeDOS, a DOS-like environment with command-line editing and retrieval of previous commands.

There's more. The 140K RAM required to boot drops to as low as 80K when you run TreeDOS or a different program from *Tree86*. A configuration program enables you to set which drives to log upon entry into *Tree86*. Tree structures for each drive remain in RAM until you quit the program and can be stored on-disk for quicker logging the next day.

Tree86 rates as a good buy. For $40 less than the market leader, you get all the leader's features and more.

PC MAGAZINE FACT FILE

***Tree86*, Version 2.0**
The Aldridge Co.
2500 City West Blvd., # 575
Houston, TX 77042
(713) 953-1940
List Price: $89
Requires: 140K RAM for booting, one disk drive (hard disk recommended), DOS 2.0 or later (3.0 recommended).
In Short: Multiple drive logging and directory copying are among the attractive features of this mouse-driven hard disk manager. Not copy protected.

CIRCLE 434 ON READER SERVICE CARD

$90 Utility Dresses Up 9-Pin Print

PC HANDS ON

BY JONATHAN MATZKIN

There is nothing so enticing as software that tweaks extra performance out of your hardware. *The Image Printing Utilities*, from Image Computer Systems, give your 9-pin printer capabilities more characteristic of high-end dot matrix machines. The software also teaches your 9-pin a few tricks that even high-end printers can't muster.

For openers, the package lets you load up to eight high-quality fonts at once, from a selection of 16, and freely mix them within documents. The fonts can be printed with all the formatting and character attributes your word processor and printer normally provide.

The utilities package consists of two programs—*Metatext* and *ImagePrint*.

Metatext is memory resident and installs from either the command line or your AUTOEXEC.BAT file. With one or two fonts selected, the program occupies about 60K RAM. 120K RAM is required for the maximum of eight simultaneously available fonts.

A command-line switch specifies print quality for each chosen font. To achieve the highest quality, *Metatext* causes six passes of the printhead. The results rival output from some 24-pin dot matrix machines.

To switch among selected fonts, you simply insert a backslash, followed by a number corresponding to the appropriate font, into your word processor file. Underlining, boldfacing, and other character attributes are invoked as usual.

ImagePrint offers the same choice of fonts, print qualities, and attributes as *Metatext* but takes a previously created ASCII text file as input. You tell *ImagePrint* what to do with the file by embedding commands that correspond to desired fonts and attributes.

In its "typewriter mode," *ImagePrint* converts your keyboard and printer into a supercharged typewriter that would make mere mortal office machines slink away in shame.

The program opens a one-line buffer that is printed immediately when you tap Enter. Your text is displayed on-screen as you type. All of *ImagePrint*'s fonts and features are available.

The Image Printing Utilities won't magically transform your 9-pin printer into a LaserJet, and the additional head passes mean a decrease in speed and an increase in wear and tear. But the boost in print quality and versatility far outweighs these drawbacks.

The Image Printing Utilities *add multiple fonts to your 9-pin printer and convert your keyboard and printer into a versatile typewriter.*

```
FONT1: Cubic font
FONT2: Elite font
FONT3: Italic font
FONT4: Orator font
FONT5: Typewriter font
```

PC MAGAZINE FACT FILE

The Image Printing Utilities
Image Computer Systems
P.O. Box 647
Avon, CT 06001
(203) 678-8771
List Price: $89.95
Requires: 128K RAM, DOS 2.0 or later, printer compatible with IBM graphics printer or Epson dot matrix printer.
In Short: Inexpensive utilities that coax startling performance out of your 9-pin dot matrix printer.

CIRCLE 435 ON READER SERVICE CARD

Why Paradox 2.0 makes your network run like clockwork

Paradox® runs smoothly, intelligently and so transparently that multiple users can access the same data at the same time—without being aware of each other or getting in each other's way.

With Paradox news travels fast and it's always accurate

Paradox *automatically* updates itself with a screen-refresh that ensures that all the data is up to date and accurate all the time. Record-locking, Paradox-style, safeguards data integrity by preventing for example, two different users from making changes to the same record at the same time.

How to make your multiuser network work

To run Paradox 2.0 or the Paradox Network Pack on a network, you need:

- Novell with Novell Advanced Netware version 2.0A or higher
- 3Com 3Plus with 3Com 3+ operating system version 1.0, 1.1 or higher
- IBM Token Ring or PC Network with IBM PC Local Area Network Program version 1.12 or higher
- Torus Tapestry version 1.45 or higher
- AT&T Starlan version 1.1 or higher
- Banyan VINES version 2.10
- Other network configurations that are 100% compatible with DOS 3.1 and one of the listed networks

System Requirements for the Network Workstation

- DOS 3.1 or higher
- 640K RAM
- Any combination of hard, floppy, or no disk drives
- Compatible monochrome, color, or EGA monitor with adapter

*Customer satisfaction is our main concern. If within 60 days of purchase this product does not perform in accordance with our claims, call our customer service department, and we will arrange a refund.

Paradox is a registered trademark of Ansa Software. Ansa is a Borland International Company. Other brand and product names are registered trademarks or trademarks of their respective holders. Copyright ©1988 Borland International BI 1243

"When I saw the record-locking and autorefresh in action, I couldn't believe it. Here was a true network application, a program that can actually take advantage of a network to provide more features and functions, things that can't be done with a stand-alone PC.

Aaron Brenner, LAN Magazine

With Version 2.0, Paradox becomes a sophisticated multiuser product that boasts an impressive selection of data-production features and password-security levels.

Rusel DeMaria, PC Week"

Paradox responds instantly to "Query-by-Example"

The method you use to ask questions is called Query-by-Example. Instead of spending time figuring out *how* to do the query, you simply give Paradox an example of the results you're looking for. Paradox picks up the example and automatically seeks the fastest way of getting the answer.

Queries are flexible and interactive. And in Paradox, unlike in other databases, it's just as simple to query more than one table as it is to query one.

"The program elegantly handles all the chores of a multiuser database system with little or no effort by network users.

Mark Cook and Steve King, Data Based Advisor"

"Paradox . . . has quickly become the state-of-the-art product among PC database managers . . . Paradox still reigns supreme as the thinking user's DBMS.

Jim Seymour, PC Magazine"

You don't have to be a genius to use Paradox

Even if you're a beginner, Paradox is the only relational database manager that you can take out of the box and begin using right away.

Because Paradox is driven by the very latest in artificial intelligence technology, it does almost everything for you—except take itself out of the box. (If you've ever used 1-2-3® or dBASE,® you already know how to use Paradox. It has Lotus-like menus, and Paradox documentation includes "A Quick Guide to Paradox for Lotus Users" and "A Quick Guide to Paradox for dBASE users.") Paradox, it makes your network work.

60-Day Money-back Guarantee*

For a brochure or the dealer nearest you
Call (800) 543-7543
CIRCLE 377 ON READER SERVICE CARD

BORLAND
INTERNATIONAL

THE BEST EXECUTIVE WORD PROCESSOR IN THE WORLD.*

$29.95

ANNOUNCING A STEAL FOR PFS: WRITE AND PROFESSIONAL WRITE OWNERS, AND A BARGAIN FOR EVERYONE ELSE.

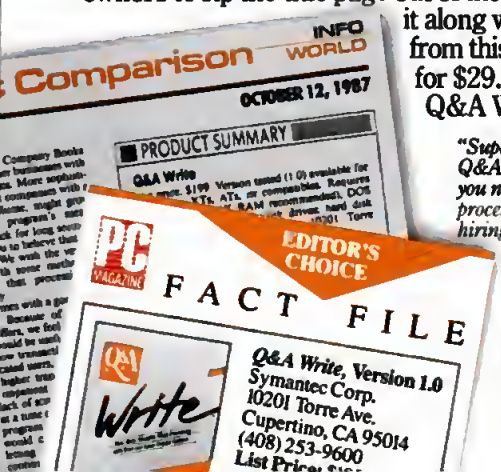
""A lot of factors make Q&A Write ($199) the best in this group." Executive Word Processor Comparisons, John Lombardi, InfoWorld Magazine, 10/12/87, Pg. 59.* Surprised? Unfortunately, some people are. Because even though Q&A Write was rated the best executive (easy-to-use, yet powerful) word processor by both *InfoWorld* and *PC Magazine*, PFS:Professional Write continues to sell. So we've cooked up an upgrade and promotion to get the word out. And hopefully when it's finished, thoughts of PFS:Write will be too.

The first 5000 PFS:Write or PFS:Professional Write owners to rip the title page out of their manual and send it along with the coupon from this ad and a check for $29.95 get a complete Q&A Write package.

Feature:	Q&A Write	PFS: Professional
Number of fonts per document	9	1
Supports HP LaserJet cartridge and soft fonts	Yes	No
Prints Lotus graphs in documents	Yes	No
Hot-links documents to Lotus spreadsheets	Yes	No
Imports Lotus spreadsheets into documents for editing with fonts and enhancements	Yes	No
Number of columns per document	8	1
Runs Lotus and up to 7 programs or macros from its main menu	Yes	No
Supports Postscript	Yes	No
Date/time-stamp documents	Yes	No

The same, complete package *InfoWorld* rated #1 and *PC Magazine* named Editor's Choice. That's our PFS upgrade. And if you don't own PFS, 5000 of you can get a fully functional trial-size Q&A Write package (normally $9.95) absolutely free just by calling the toll-free number below. Upgrade or call today. But hurry. When the word gets out, 5000 will go fast. Q&A Write instead of PFS. For easy yet powerful word processing, it's the best in the *World*.

For your $29.95 upgrade or FREE trial-size call: (800) 888-0886 Ex. 175P



"Superpowerful, superfast, Q&A Write is superessential if you need a professional word processor that doesn't require hiring a personal trainer."

Carol Olsen Day, PC Magazine, Editor's Choice February 29, 1988

LIST PRICE $199

SYMANTEC™
Breakthrough Software Division

☐ Please send my PFS upgrade. I enclose the title page from PFS: Write or PFS: Professional Write and $29.95.

☐ I don't own PFS, but I'd like to check out the best executive word processor with your FREE Q&A Write trial-size diskette. PCM 7/88

Total Enclosed/Authorized $ _____ ☐ Check ☐ VISA ☐ MC ☐ AMEX

Card # _____ Exp. Date _____

Name _____

Company _____

Address _____

City/State/Zip _____

Day Phone _____

Send to: Q&A Write Offer, Symantec, 10201 Torre Ave., Cupertino, CA 95014. (408) 253-9600.

Send PFS title page and $29.95 check or money-order to Q&A Write Upgrade Offer, 10201 Torre Ave., Cupertino, CA 95014 (408) 253-9600 Q&A Write now includes power features like ■ Card-File for customized mailings using addresses entered into the Card-File, or imported from dBase, 1-2-3, or other programs. ■ HP LaserJet and Apple LaserWriter ready so it uses large type and fonts (including Soft Fonts and Postscript) as easily as underlining ■ Optional DCA conversion utility available ($29.95). Upgrade offer may not be used in conjunction with any other Q&A Write or Symantec offer. Offer void where prohibited. Q&A Write is a trademark of Symantec Corporation. Other brands and products are trademarks of their respective holders. © 1988 Symantec

CIRCLE 250 ON READER SERVICE CARD

PC UPDATE

by Paula Seefeldt

Peachtree Data Query II Enhanced Uses Date Fields and Subset Databases

Peachtree Software's *Peachtree Data Query II Enhanced* is the latest report writer for use with the *Peachtree Complete II* accounting system. New features include the ability to perform arithmetic on date fields and to create subset databases. The enhanced PDQ also accepts "wildcard" matches in report selection criteria. Retail price is $199. Peachtree Software, Norcross, Ga.; (404) 564-5700.

System ABC, Version 3.2, Gains Graphic Capabilities

ABC Systems is shipping Version 3.2 of System ABC, a financial management package for farms and family businesses. The new release consists of two products, the *ABC Money Manager* and the *ABC Net Worth MicroScope*. The *Money Manager* now replaces IRS F-schedule line numbers with user-assignable

Version 3.2 of System ABC *allows a farm to record its entire history of profits and losses.*

equivalents. The *Net Worth* programs have been expanded to include graphics and can store a farm's complete net worth history. Version 3.1 owners may purchase both products as updates for a single fee of $35. The *Money Manager* retails for $250 and the *Net Worth MicroScope* is $40. ABC Systems Inc., Western, Nebr.; (402) 433-4801.

Micro Logic Designs Entry-Level Tornado

Micro Logic Corp. has added a *Mini-Tornado* software package to its product line. The scaled-down version of *Tornado* is an entry-level program that organizes bits of random information. *Mini-Tornado* stores up to 600 windows and 60,000 characters and retails for $49.95. Micro Logic Corp., Bellevue, Wash.; (206) 451-9788.

ZyINDEX Creates AutoIndexing

ZyLAB Corp. has updated its text search and retrieval program, *ZyINDEX*. Version 3.0 adds AutoIndexing, with binary file detection and LAN capability. Updates are free to users who purchased *ZyINDEX* in 1988 and $45 for those who purchased prior to 1988, until July 15. After that date, all updates are $55. New orders are $95. ZyLAB, Arlington Heights, Ill.; (312) 632-1100.

Boston Access, Version 3.4, Uses Multiple Interfaces

Version 3.4 of *Boston Access*, from Boston Software Systems, allows direct control of application interfaces by third-party software. Interfaces can now be developed among applications running on microcomputers, minicomputers, and mainframes without reprogramming and at a significantly reduced price. *Boston Access* 3.4 retails for $550. Boston Software Systems Inc., Sherborn, Mass.; (617) 653-5105.

Dolch Expands P.A.C. Line

Dolch Computer Systems has incorporated RAM cache and a plasma/EGA display into the Dolch P.A.C. portable line. The 64K RAM cache, available on the 386 model, boosts memory performance. The plasma display provides high-quality screen contrast. The RAM caching option retails for $1,000 and the plasma/EGA display is $2,500. Dolch Computer Systems, San Jose, Calif.; (408) 435-1881.

Brooklyn Bridge Gains File Manager

White Crane Systems' *The Brooklyn Bridge*, Version 2.0, has added a dual directory display manager to the file transfer utility. Other new features include a dual independent processing utility and four DOS utilities. New releases should be available this summer. Upgrades will be free to users who purchased *The Brooklyn Bridge* after May 15 and $35 for those who purchased before that date. New packages will cost $139.95. White Crane Systems Inc., Norcross, Ga.; (404) 394-3119.

Laser Fonts, Adds Menu-Driven Interface

SoftCraft is offering a new *Laser Fonts* package for *WordPerfect* and *Microsoft Word* users. Version 3.0 has a menu-driven user interface and comes bundled with *Laser Graphics* and the *Starter Font Pack*. *Laser Fonts* allows the

Laser Fonts has added a menu-driven user interface in its new Version 3.0.

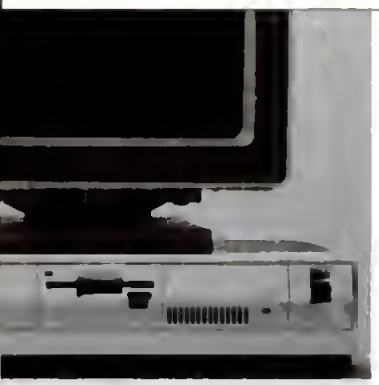
user to create fonts and symbols and has a database of over 1,500 mathematical and foreign-language symbols. Updates cost $25 for registered users, with new packages retailing for $180. SoftCraft Inc., Madison, Wis.; (800) 351-0500.

Here's a radical idea: give people who work together the means to easily share information among PCs—but don't force them to become computer experts to do it.

Here's another one. Make this network so simple to install that you can set up the whole thing in oh, say, a half hour or so.

Presenting TOPS.®

MORE NETWORK. LESS NET WORK.



With the TOPS Network, you and your co-workers can access files from each other's computers exactly as if they were sitting on your own PC or hard disk. And even print out those files (with our TOPS NetPrint™ software) directly to any printer that supports the "PostScript®" language, such as Apple's LaserWriter.™ All through easy-to-use menu commands.

The result is the very comforting—and productive—feeling of being able to concentrate on the work at hand, instead of on having to learn the network.

On a TOPS Network, every computer can share files directly with any other, thereby sharing the load of the entire network. The result is that you don't have to purchase an expensive central file server. Or shut down the network when you want to add a new computer. Or hire an extra person to manage the whole affair.

And setting up TOPS is just as straightforward. You can install the necessory network card—such as our TOPS FlashCard™—in no more than twenty minutes. Loading the TOPS software? We've unofficially clocked it under five minutes.

As if all that weren't enough, TOPS runs over common twisted-pair cabling, such as regular phone wire. Just add an easy-to-install network connector—such as the TOPS TeleConnector—at each node. And at only $189 for the software, and $239 for each TOPS FlashCard, TOPS is the least expensive way to get your workgroup working together.

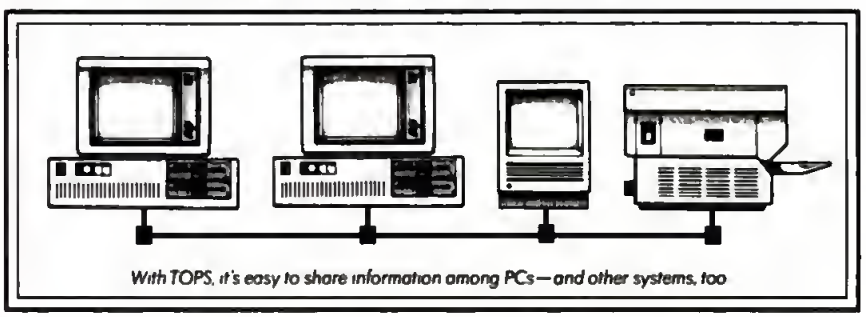
Of course with TOPS, PC-to-PC communication is just the beginning. Because without sacrificing simplicity, we also offer products that let you share information just as easily with other networks and systems, including Macintoshes™ and Sun® workstations.

Want more information? Give us a call at 800-445-TOPS (from outside the U.S. and Canada, call 415-769-8700). Or write to us at TOPS, 950 Marina Village Parkway, Alameda, California 94501.

After that, it gets easier.

TOPS®
A Sun Microsystems Company

TOPS, Sun and the Sun logo are registered trademarks of Sun Microsystems, Inc. TOPS FlashCard and TOPS NetPrint are trademarks of Sun Microsystems, Inc. PostScript is a registered trademark of Adobe Systems Incorporated. Macintosh and LaserWriter are trademarks of Apple Computer, Inc.



With TOPS, it's easy to share information among PCs—and other systems, too

CIRCLE 191 ON READER SERVICE CARD

COMMUNIQUÉS

edited by Bill Howard

You Should Look It Up

"Clone manufacturers can compete with IBM in areas other than price . . . .For example . . . IBM uses a Tanden [*sic*] hyper belt-driven drive to power its machine. The Tanden drive can be noisy. When Five Star builds its clones, it installs a Fujitsu manual direct drive instead. The Fujitsu is much quieter."

—Secrets from the Underground Shopper: The Only Book to Tell You What the Retailers Won't, *by Sue Goldstein*

You Could Look It Up

"DOS: An acronym for disk operating system. It is composed of one or more diskettes on which data can be stored and one or more disk drives to read the information stored on the disks."

—*Associated Press glossary of computer terms*, Rolling Meadows *(Ill.)* Daily Herald, *March 11, 1988*

Supermini Rivals Jockey for Market Share

By GEORGE GRIGGS

BOSTON—While supermunicomputer vendors may have not reached a stage where they have to circle the wagons to fend off onslaughts from a variety of competing technologies industry observers feel they will have to at least ride shotgun to protect their market share

Supermini vendors market share is being challenged at all levels—the high end, mid-range and low end—by super

isn't any question that some of the problems they're solving could have been done in a time-sharing environment, for example on mainframes or minicomputers," said Kerstetter

"I will absolutely give them that," the analyst said "They re accomplishing things on high powered work stations that could only have been done on high powered minicomputers a few years ago That s a fact of life "

Computer Systems Corp of Littleton, Mass , Convergent Computer Corp of Richardson, Texas, and Multiflow Computer Inc of Bradford, Conn

Kerstetter also said mini vendors were continually faced with an erosion of market share of their low-end offer

But just wait till the Fruit of the Loom 386 ships. (Headline from MIS Week, *March 14, 1988)*

Child Prodigy

"Chau learned computer programming at Jackson High School as a fourth-grader and is teaching himself a complex computer language called "hexidecimal" at home. He's popular in the Unified Arts class, where he spends a good deal of time answering other students' questions about rudimentary computer functions."

—Jackson *(Miss.)* Citizen Patriot, *March 6, 1988*

Dept. of Tautology

"Postscript operates on an infinite grid. This accommodates most page sizes that would be used."

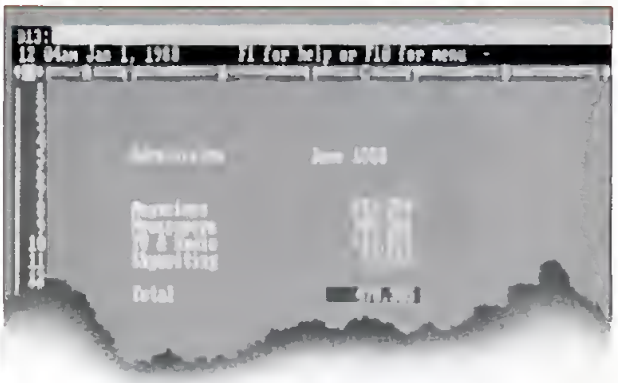
—PC Publishing. *January 1988*

Borland's Quattro Doubles In Price, but Is Still Half The Cost of Rival 1-2-3

SCOTTS VALLEY, Calif.—Borland International Inc.'s $199.95 introductory offer for its new Quattro spreadsheet is now over.

After a 90-day promotion, Quattro's price tag has been raised to $247.50, half the suggested retail price of Lotus 1-2-3, according to Robin Shepherd, a Borland spokeswoman.

New math at work? (PC Week, *March 22, 1988)*



More new math: The numbers and formula are in column C in this Lucid 3-D *advertisement, but the display (upper left) says Column D.*

Classified Intelligence

Senior Programmer Analyst . . . The qualified candidate should have at least 3 years experience as a Programmer Analyst on an IBM System 38 with a Computer Size, Math or Business degree . . .

—Atlanta Journal & Constitution, *February 7, 1988*

Computer-PC Compatible with flopping-key board printer etc. $1350

—McAllen *(Tex.)* Monitor, *February 27, 1988*

DEST Workless station Lmodel 34125 OCR, $4500.

—The Star Tribune *(St. Paul, Minn.), February 25, 1988*

Free Software—Free IBM software, choose from word processors, data bases, games, education, spread sheets, and more. Call xxx-xxxx, leave a mess.

—California Computer News *(Sacramento), February 26, 1988*

COMPUTER CBM Commander model MDL8032, dual desk with printer, all accounting program, paper clips and work PRO.

—The Ottawa Citizen, *March 1, 1988*

Dandy 1,000 with hard disc, 10 megabytes, color excellent condition.

—The San Juan Star, *February 22, 1988*

Send your offerings to Communiqués, PC Magazine, *One Park Ave., New York, NY 10016 or MCI Mail 157-9301. Please print your name legibly and include your T-shirt size. Contributors receive $50 and a* PC Magazine *T-shirt.*

Winners this issue: Jay Nusholtz (Supermini rivals Jockey), Thomas Mosteller (Quattro pricing), Mark Warner (Lucid 3-D), Dan Riley (Postscript), Timothy Clore (hexidecimal), Chuck Reiter (computer size), Paul Clarkson (workless station), Michael Sandberg (leave a mess), Edward Cavazos (flopping-key board), Mark Bornais (paper clips), David F. Gleason (Dondy 1,000), Doris Malon (DOS), Luigino Moscio (hyper belt-driven drive).

PREVIEWS FROM Discount BOOK OF SOFTWARE™ AT LEAST 25% OFF!

EVERY DAY WE OFFER SOFTWARE AT THE LOWEST PRICES IMAGINABLE

THOUSANDS OF SOFTWARE TITLES AT BIG DISCOUNTS!
CALL US IF IT IS NOT LISTED HERE—WE HAVE IT!

SOFTWARE FOR "IBM"

ACCOUNTING

Business Builder	$596
DAC Easy Actg 2.0	63
Dollars and Sense 3.1	103
Information Management	146
Managing Your Money 4.0	123
One Write Plus	220
Quicken 2.0	34
Smart Money	59
Sylvia Porter Personal Finance	74

COMMUNICATION

Carbon Copy Plus	$118
Crosstalk MK.4	128
Crosstalk XVI	63
[illegible]	37
Laplink	85
Relay Gold 2.0	138
Relay Silver 1.0	112
Side Talk	90
Transporter 1.4	221

DATABASE

@Base	$118
dBase III Plus	398
Data Manager PC	30
Database Manager 2	221
dBXL 1.3	149
Enable 2.0	408
Microsoft Works 1.0	146
PC Computer Plus	60
PFS: First Choice 2.0	108
Q & A 3.0	208
Rapid File 1.2	221
R:Base For DOS	448
Reflex 1.14	66
Thinktank 2.01	146

GRAPHICS

Design CAD 3D	168
Gem III Draw Plus	188
Generic CADD 3.0	58
Graph-in-the-box Rel. 2	57
Grasp 3.0	74
Harvard Graphics 2.1	371
In-A-Vision	298
Microsoft Chart 3.0	248
Newsroom Pro	48
PFS Graph	105
Print Shop	38
Print Shop Companion	30
Sign Master 6.2	158

LANGUAGES

Basic Compiler 5.36	$268
Lattice C Compiler 3.2	248
Macro Assembler 5.0	96
Pascal Compiler 3.32	188
RM Basic	450
Smart Guide for DOS	22
Turbo Basic 1.1	60
Turbo C 1.5	60
Turbo Tutor 4.0	60

PROJECT MANAGEMENT

Gem Desk Top Publisher	$238
Gem Desk Top	37
Harvard Total Project Manager	375
Timeline	198
Timelink Plus III	37

SPREADSHEET

Lotus 1-2-3 2.01	$298
Microsoft Excel 2.0	318
Multiplan 3.04	118
PFS: Professional Plan	105
Quattro	128
Surpass	275
Swift & Easy	37
Swiftcalc PC w/Sideways	42
VP Planner	55

UTILITIES

Desqview	78
DOS Max	$60
Fastback 5.14	93
Genie	213
Keywords 3.0	74
Mace Utilities 4.10	55
Msmory Mate 3.0	52
Norton Utilities-Advanced	83
PC Tools Deluxe 4.2	59
Quick Index III	111
Runtime	112
Sideways 3.2	41
SQZ Plus	59
Turbo Lightning	57
Windows 2.03	63

WORD PROCESSING

Bank St Writer Plus	$49
Celebrity	67
Easy Extrs 1.5	74
Microsoft Word 4.0	198
Multimate Adv. II	278
PFS: Prof. Write	118
Q & A Write	118
Samna Word IV	448
Volkswriter Dlx Plus	74
WordPerfect 4.2	198
Word Finder	45
Zyindex (standard) 2.2	108

Software for "MACINTOSH

dBASE MAC	$298
Clickart Publications	37
Copy II Mac 7.1	30
Decision Map	108
Dollars & Sense 4.0	112
Draw It Again Sam	112
Easy 3D	112
Fastback 1.01	75
In Talk 3.0	146
Lazerstart 2.5	71
MAC Vision 2.0	299
Microsoft Chart 1.2	78
Microsoft Excel 1.06	296
Microsoft Works 1.1	198
Microsoft Multiplan 1.11	118
More 1.1c	221
Pixel Paint	371
Power Point 1.0	228
Printworks for MAC (Laser)	109
Ready Set go 4.0	371
Spellswell 2.0	31
Superspool 4.0	75
Turbo Pascal	74
Turbo Tutor	52
Typing Tutor IV	44
Volks	75
Word Finder 2.0	44
Write Now 2.0	148

PRICES SUBJECT TO CHANGE WITHOUT NOTICE. Defective Software will be replaced immediately.

Peter Norton COMPUTING · Nantucket · MASTER GRAPHICS SERIES ASHTON-TATE · True BASIC inc. · MicroPro · WordPerfect CORPORATION · Broderbund · Simon & Schuster Software · Borland · Microsoft

WE HAVE THEM ALL!

At OMEGA PRESS we strive to offer the very latest software packages, including version changes. At times however discontinued packages may affect our advertised programs.

CIRCLE 368 ON READER SERVICE CARD

NEW! HOT! TITLES

SOFTWARE FOR "IBM"

Ability Plus 1.01	$158
Back Pack Plus 1.01	98
File Rescue Plus	37
Grandview	174
Networker Plus 2.0	194
Norton Guides for OS/2 API	88
Pags Perfect	371
Quick Basic 4.0	68
VP Planner Plus 2.0	94

Software for "MACINTOSH

Bookmark MAC 1.0	$ 76
Lap Link MAC	105
MAC SQZ	60
Quicken (for MAC)	34
Timeslips III MAC	149

CALL TOLL FREE

1-800-222-Book™
1-800-222-2665

IN CT. CALL (203) 359-1660
8:00 am—5:30 pm, Mon. thru Fri.

WHY YOU SHOULD ORDER FROM THE BOOK OF DISCOUNT SOFTWARE:

- *25% or MORE Off List Prices on All Software*
- *NO HIDDEN CHARGES*
- *No Shipping Charges on Credit Card or Pre-paid Orders*
- *No Handling Charges Ever*
- *Credit Card Convenience*

MasterCard · VISA · American Express

- *Your ONE SOURCE for Thousands of Software Titles—All at Discount Prices.*
- *No Membership Fee*

MAIL IN FOR FREE HANDBOOKS

PLEASE RUSH ME MY FREE COPY OF:

Discount BOOK OF SOFTWARE™

ALSO! NEW!

☐ **Book of Books™**
Cataloging 12,000 Scientific and Technical Books from 14 leading publishers.

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

Or Send Business Card PC 7/88

MAIL TO:

OMEGA PRESS
An OMEGA Technologies Company
Eight Omega Drive, P.O. Box 4182
Stamford, CT 06907

©COPYRIGHT 1988, OMEGA PRESS, INC. ALL RIGHTS RESERVED. PRINTED IN USA

Perfect matches to DEC user needs. Hip. Hip. And Hooray.

One-size-fits-all is an attribute best reserved for inexpensive socks. In the realm of PC-based emulation and communications software for DEC mainframe users, it's important to match specific user needs with specific product attributes. We have.

SmarTerm® 240 features exact four-color emulation of a DEC® VT241 terminal. Along with delivering full-screen ReGIS® and Tektronix® 4010/4014 graphics, SmarTerm 240 offers precise VT220, VT102, VT100, and VT52 text emulation.

For non-graphics applications, SmarTerm® 220 duplicates virtually every SmarTerm 240 text, communication, and ease-of-use feature. Three error-free file transfer protocols, including Kermit and Xmodem, are provided. Downloading minimizes on-line time requirements to boost overall system efficiency. And an optional network package allows direct LAN access to shared modems, printers, as well as host mainframes.

As SmarTerm 240 and 220 focus on graphics and text, new SmartMOVE® makes PC-to-the-rest-of-the-World communications sharper than ever. Speed connect, auto redial, and background file transfer features make this VT100 emulator a loud and clear choice for advanced communications requirements.

Graphics, text, and communications. If you're looking for a perfect fit, seek the software sized and priced to match your needs. Persoft has it. Period.

Visit your dealer or phone us at 608-273-6000.

persoft®

© 1987 Persoft Inc. All rights reserved. Persoft, SmarTerm, and SmartMOVE are registered trademarks of Persoft Inc. DEC, VT and ReGIS are trademarks of Digital Equipment Corporation. Tektronix is a registered trademark of Tektronix Inc.

CIRCLE 365 ON READER SERVICE CARD

■ BILL MACHRONE

IN YOUR (INTER)FACE

It's no wonder that this industry can't make any progress on user interfaces. All the decision makers are too busy attending one another's press conferences to get any work done.

My faith is shattered. I don't believe anybody anymore. For the price of a press conference, anyone can pull together a spec, call it a standard, and get half a dozen or more industry figures onto a podium to spout some platitudes about how it's The Way of the Future and the surefire cure for everything from the balance of payments to pattern baldness.

The software developers jump on the bandwagon with utter abandon, apparently terrified that one small change in hardware features or end-user tastes will leave them playing second fiddle. Actually, it isn't a bandwagon so much as a juggernaut, irresistibly consuming resources.

There's more at stake here than corporate pride and profitability. We're talking about the hearts and minds of developers, distribution channels, and corporations. The needs of the end user aren't an issue, even though end-user computing is supposedly what this is all about. This weird, interlocking network of "You tout my product and I'll tout yours" is a drain on the essential energy of our industry. The trade press goes galloping off over this hill and that, in pursuit of the latest strategic alliance, while end users just get confused. And when they get confused they tend to do nothing until they get unconfused. Thus, they don't buy into the very technologies being hyped.

Here's a brief rundown of the hoops that software developers have had to jump through of late:

OS/2 Just when everyone was getting happy with DOS, along comes OS/2. The combatants had finally gotten the EMS spec squared away and the old 32MB volume limit was about to become history. After reading enough *PC Magazine* articles, anybody could write a well-behaved TSR program. Then Microsoft and IBM tell us DOS was never very good anyway. I believed. I still believe. The richness of OS/2's calls and the prospect of multithreading and multitasking are enough to turn me away from the safe, well-known world of DOS. The cost to developers is enormous, but they can pull it off if they're not distracted.

Presentation Manager The Presentation Manager is a different story. While the Macintosh was proving that bitmapped is better, the EGA was proving that color is better. The two merged in *Microsoft Windows*, which was too memory-constrained and processor-bound to make an appreciable dent. At the same time, IBM was shopping for a universal user interface to tie its disparate and incompatible product lines together. The result was Presentation Manager. Never mind that the beta version of the developer's kit just shipped. Or that all the *Windows* code that developers wrote doesn't port over. They lined up dutifully on the podium.

OS/2 LAN Manager The OS/2 LAN Manager is a multiuser operating system in drag. Microsoft hopes that IBM will adopt some or all of it into its networking scheme, but IBM is playing coy. The guys on the podium were on a first-name basis by this time.

Macintosh Suddenly, to be considered a serious player you've got to support Macintosh, too. The audiences at the Mac II press conferences and shows, however, have their own heroes. The dutiful minions of DOS are shown the respect and attention normally accorded to the family dog.

New Wave New Wave is Hewlett-Packard's answer to the Macintosh. In fact, it out-Macs the Mac. The Apple folks are gnashing their teeth and firing off lawsuits over its look and the way it synchronizes tasks that know nothing about one another. It shows you what you can do with a dream and 300 person-years of programming time. It runs under *Windows* today, Presentation Manager tomorrow. There's just this one little problem. It's different. New Wave's benefits aren't free—they require substantial reprogramming of *Windows* applications to harness them. Yet the band played on, praises and promises flew from the podium, and R&D dollars were committed.

Unix Unix is the newest old hoop to

Illustration: Cathie Bleck

DON'T

10MHz
Complete System with Single 360K Drive & Monographic Monitor Assembled & Tested IBM® XT Compatible
With MSDOS 3.3 Add $89

™ Swan XT10
$649

12MHz
CompleteSystem with 1 2MB Drive & Monographic Monitor Assembled & Tested IBM®AT Compatible
With MSDOS 3.3 Add $89

™ Swan AT12
$1059

Standard Features

- 10/4.77 MHz 8088-1CPU
- 640K RAM
- 150W Power Supply
- 8 Expansion Slots
- (1) Serial Port
- Herculea Compatible Vidao Card (720 x 348)
- (1) Parallel Port
- (1) Game Port
- Clock Calendar w/Battery Backup
- 101 Key Enhanced "AT" Touch & Click Styla Keyboard
- Quality HI-Rasolution Amber Monitor w/Tilt & Swivel

Mono Syatem w/Dual Floppies	$729.00
Mono Syatem w/20MB Seagata HD	$959.00*
Mono Systam w/30MB Hard Driva	$999.00*
Base Unit w/o Monitor or Video Card	$549.00*

Single 360K Floppy Drive

Standard Features

- 80286 12/6 MHz (Kayboard Switchabla) 11.7 Norton S.I.Rating
- 640K of RAM on 1MB Motharboard
- 200W Powar Supply
- Ports: (1) Sarial , (1) Parallel, (1) Game
- Dual Floppy/Dual Hard Drive Controllar
- (8) Expansion Slots
- 101 Enhanced "AT" Touch & Click Styla Kayboard
- Clock Calendar w/Battary Backup
- Harculea Compatible Video Card (720 x 348) w/Parallel Port (2nd)
- Quality HI-Rasolution Ambar Monitor w/Tilt & Swivel

Mono System w/40MB Seagate HD #251	$1495
Mono System w/80MB Seagate HD #4096	$1929
Base Unit w/o Monitor or Video Card	$959

Monochrome to Color System, with CGA card and RGB Monitor, Add $170
Monochrome to Enhanced Color System with 640 x 480 EGA card (CGA, MDA, HGA modes) and EGA monitor, Add $399

30 DAY SATISFACTION GUARANTEE Your complete satisfaction is our top priorty. Any Swan system may be returned within 30 days from the data of shipmant for a full rafund. *

FOR YOUR PROTECTION WE GO THE EXTRA YEAR A full 1 year warranty is included, with a 2nd year SEW (Swan Extended Warranty) available. Call or write for details.

FAST DELIVERY... We ship within 24 hours.†

TECHNICAL SUPPORT Our support staff is on call 9-5 Mon-Fri to answer all of your questions and make eure that you get the most from your systeme.

YOUR COMPUTER INVESTMENT IS HASSLE FREE!!!

SWAN VIDEO & I/O CARDS

Switchable Video Card MGA/CGA/Composite w/parallel port	$79
Color half card (640 x 200) CGA Compatible	$69
Monographics, Hercules Compatible, 2 Floppy Controller, Parallel, Serial, Gameport, Clock & Calender w/Battery Backup	$119
Same board as above,except with CGA output instead	$109

* *Items returned must be as-new, without modification or damage. All warranty cards, manuals and packaging must be included. Return shipping must be prepaid and insured, bearing a RAC (Return Authorization Code) on the shipping label*
† *On in stock items. Custom Systems May Take Longer*

ALDUS
Pagemaker (3.0) ..... $CALL

AMERICAN
Design CAD 3.0 ..... $189.00

ASHTON-TATE

Byline	$195.00
dBase III+	$389.00
dBase IV	$CALL
Draw Applause	$295.00
FrameWork II	$399.00
Multimate Advantage II	$299.95
Rapidfile	$244.00

BORLAND

Quattro	$129.00
Eureka	$104.95
Paradox (2.0)	$409.00
Reflex	$89.95
Reflex Workshop	$44.95
Sidekick(unprotected)	$54.95
Sidekick Plus	$129.95
Superkey	$59.95
Sprint	$CALL
Turbo Basic	$67.00
Turbo C	$75.95
Turbo Developers Libry	$259.95
Turbo Lightning	$59.95
Turbo Pascal	$62.95
Turbo Pascal.N. Mthds	$62.95
Turbo Prolog	$64.95
Turbo Prolog Toolbox	$64.95
Turbo Tutor	$62.95

PRINTERS

Panasonic

1080III	$164.95
1091iII	$199.00
1092I	$319.00
1592	$389.00
1524	$599.00
1595	$469.00
3131	$319.00
3151	$519.00
Laser Printer	$CALL

CITIZEN

120D	$169.95
180D	$CALL
MSP-40	$319.00
MSP-45	$CALL
Premier 35	$539.00
Tribute 224	$679.00

star

NX-1000	$169.95
NX-1000 Reinbow	$229.95
NX-15	$349.00
ND-1S	$429.00
NB24-10	$499.00
NB24-15	$639.00

EPSON
CALL FOR PRICING ON EPSON PRODUCTS

OPEN: 8:00AM-9:00PM Mon-Fri; 10:00AM-6:00PM Sat, 12:00PM-8:00PM Sun EAST COAST TIME

tcp TUSSEY COMPUTER PRODUCTS P.O. BOX 1006 STATE COLLEGE, PA 16804

SETTLE FOR LESS...tcp SHIPS IT

SOFTWARE

BEDFORD
Integrated Accounting $199.00

BOEING
Boeing Calc $209.00
Boeing Graph $189.00

BRODERBUND
Graphics Library Disks $24.95
Print Shop $39.95
Print Shop Companion $32.00
Toy Shop $42.95

CENTRAL POINT
COPY II PC $27.00
Deluxe Option Board $99.00
PC Tools Deluxe $44.00

DAC SOFTWARE
Dac Easy Accounting $62.95
Dac Easy Acct Tutor ..... $CALL
Dac Easy Payroll $39.95
Dac Easy Payroll Tutor ..... $CALL

FIFTH GENERATION
Fastback Plus $95.00

FUNK
Sideways $37.95
Worksheet Utilities $59.00

GENERIC SOFTWARE
Gen CADD 3.0 ..... $69.95
Gen CADD 3-D Modeling $CALL
Gen CADD w/Dot Plot $89.95
Call For Pricing on Libraries

LOTUS
123 ..... $307.00
Freelance Plus $339.00
Manuscript $337.00
Metro $62.00
Symphony $439.00

MECA
Managing Your Money $129.95

MERIDIAN TECHNOLOGY
Carbon Copy Plus $109.00

MICROPRO
Wordstar 2000+ ..... $CALL
Wordstar Prof Rel 4 ..... $229.00

MICROLYTICS
GOfer $37.00
Word Finder $32.95

MICROPRO
Wordstar 2000+ ..... $CALL
Wordstar Prof Rel 4 ..... $32.95

Microsoft
PC Excel $319.00
PC Works $129.00
Bookshelf w/CD ROM ..... $CALL
C Compiler $295.00
Chart 3.0 ..... $249.00
Flight Simulator $34.95
Fortran $299.00
Macro Assembler $99.95
Learning DOS $34.95
MS-DOS & GW Basic ..... $CALL
Mouse $109.00
Pascal $179.00
Project $349.00
Quick Basic $64.95
Quick C $64.95
Windows 2.03 ..... $69.00
Windows/386 ..... $129.00
Word Version 4.0 ..... $219.00

MICROSTUFF
Crosstalk XVI $94.00

MIGENT
Ability Plus $149.00

NORTON PRODUCTS
Norton Commander $39.95
Norton Utilities $49.95
Norton Advanced Utilities $84.00

PAPERBACK SOFTWARE
VP Expert $64.95
VP Planner Plus $89.95

PERSONICS CORP
Smart Notes $47.95

QUARTERDECK
DESQView $79.95

SOFTWARE PUBLISHING
First Publisher $59.00
First Publishing Fonts ..... $CALL
Harvard Total PM II $369.00
Harvard Graphics $279.00
PFS First Choice $85.00
Professional File $139.00
Professional Plan $79.00
Professional Write $115.00

SPRINGBOARD
Newsroom Pro $49.95
Clip Art I or III ..... $CALL

SYMANTEC
Q & A $199.00
Q & A Write $115.00

TURNER HALL
Note It Plus $49.00
SQZ Plus $57.95

WORD PERFECT
Date Perfect ..... $CALL
Executive $115.00
Library $59.00
Plan Perfect $179.00
Wordperfect (5.0) ..... $CALL

XEROX
Ventura Publisher $499.00

HARDWARE

PC HARD DRIVES

MiniScribe
8438 30MB w/cont.(65 ms) $339.00
3650 40MB (61 ms) $349.00
3053 40MB (25 ms) $579.00
6085 71 MB (28 ms) $779.00

Seagate
ST-225 w/cont.20MB (65 ms) $259.00
ST-238 w/cont.30MB (65 ms) $299.00
ST-251-0 40MB (42 ms) $379.00
ST-251-1 40MB (28 ms) $489.00
ST-4096 80MB (28 ms) $799.00

Swan Modem
- Hayes ® compatible
- Auto answer/dial
- Tone and Pulse
- Full 1 year warranty

Includes PC Talk III software
1200 baud Internal $69
2400 baud Internal $119

Swan Technologies
TAPE DRIVE BACKUPS 1 YR WARRANTY
40MB XT Tape (Internal) $339.00
40MB AT Tape (Internal) $359.00
40MB AT Tape (External) $479.00

MAGNAVOX
7613 TTL (Green) $89.00
7623 TTL (Amber) $89.00
8762 RGB/CGA $249.00
8515 RGB/CGA $289.00
8053 EGA $349.00
8873 EGA Multimode $479.00

PC ADD ON BOARDS

AST
Advantage! (128K) ..... $CALL
Advantage Premium (512K) ..... FOR
Rampage 286 (512K) ..... PRICING
SixPakPlus (64K) ..... ON
SixPakPremium (512K) ..... AST!

ATI
EGA Wonder $179.00
Graphic Solution $169.00
VIP VGA $299.00

BOCA RESEARCH
CALL FOR PRICING ON VIDEO AND BOCA RAM CARDS

EPIC
EPIC EGA $119.00
EPIC EGA 480 ..... $129.00

HERCULES
Graphics Plus $179.00
In-Color Card $299.00
Other Hercules boards in stock... Call for price

Swan RAM CARDS
Abovboard Compatible Memory Cards - Include Software Utilities Disk
XT RAM CARD w/0K $99
AT RAM CARD w/0K $119
Call For Pricing on 512K/1MB/2MB Upgrades

INTEL
AboveBoard PS/286 ..... $CALL
AboveBoard 286 ..... $CALL

PARADISE
Autoswitch 350 ..... $149.00
Autoswitch 480 ..... $169.00
Autoswitch Mono $159.00
Paradise VGA $269.00

VIDEO 7
VEGA Deluxe $199.00
VEGA VGA $299.00

ZUCKER
CGA $89.95
Monochrome Graphics $94.95
Memory Expansion ..... $CALL

MONITORS

TTL Monochrome
Amdek 410A Amber, Green, or White $149.00
Packard Bell Amber w/std $97.00
Samsung TTL $89.00

RGB/CGA
Goldstar 4135 ..... $269.00
Thomson 4160 ..... $279.00
Samsung SC452C $199.00

EGA
NEC Multisync II $569.00
Packard Bell EGA/CGA/TTL Auto $419.00
Amdek 722 ..... $477.00
Magnavox 8873 Multimode $479.00
Thomson 4460 ..... $399.00

IMSI Optical Mouse w/Dr Halo III $89.00
MICROSOFT Mouse $109.00
LOGITECH HiRez (320dpi) Mouse $99.00

FEDERAL EXPRESS

Software orders over $100 and Accessories under 6 pounds will be shipped Federal Express
(Even at these prices) You only pay TCP's standard shipping charge of $4.00 per order. Orders arriving before 3:00 PM our time will be shipped out same day. If part of your order is back-ordered the remainder will be shipped UPS Ground FREE!

SECURITY
- Your Credit Card is not charged until your order is shipped.
- We insure your order at no extra cost to you.
- Tussey is a financially strong and well established company.

CUSTOMER SUPPORT
- After sales support
- Knowledgeable staff, all graduates of Tussey's "Computer Boot Camp".
- Our advanced warehouse/materials handling system assures your order is shipped out accurately & on time.
- Our IBM 5360 allows instant order and inventory status.

To order by mail: We accept money order, certified check, personal check. Allow 2 weeks for personal & company checks to clear **Shipping:** $4.00 for software FOR ALL HARDWARE AND ANY ACCESSORY OVER 6lbs Call our Toll Free Number 1-800-468-9044 for shipping charges Add $3.00 per box shipped COD Additional shipping required on APO, FPO AK HI and foreign orders **Terms:** PRICES REFLECT CASH DISCOUNT, ADD 1.9% FOR MASTERCARD OR VISA.
ALL SALES ARE FINAL
Defective items replaced or repaired at our discretion Pennsylvania residents add 6% sales tax Prices and terms subject to change without notice.

EDUCATIONAL & CORP ACCOUNTS
Purchase orders accepted from qualified corporations and institutions
CALL 1-800-468-9044
FAX 814-237-4450

MODEMS
Hayes Smart Modem
1200B Internal $259.00
2400B Internal ..... $CALL
Packard Bell External
300/1200 baud $149.00
2400 baud External $179.00
Zucker
300/1200 Half Card Modem with software $87.00

MIGENT ■ 300/1200 Bd
Pocket Modem $109.00

DISKS

per box of 10		3.50	5.25"
BONUS	DS/DD	$16.95	$6.95
MAXELL	DS/DD	$17.95	$9.95
VERBATIM	DS/DD	$19.95	$9.95
SONY	DS/DD	$16.95	$8.95

intel CHIPS
Numeric Coprocessors
8087 ..... $104.00
8087-2 ..... $147.00
80287 ..... $179.00
80287-8 ..... $259.00

SWAN EGA VIDEO CARD ■ 640 X 480 Resolution $129
Call for Pricing on Memory Chips. Prices are too volatile to list!!!

PC 1640 AMSTRAD PPC 640

DESK TOP
- 8MHz Processor/640K
- 3 Available Slots
- Parallel, Serial & Game Port
- Microsoft Compatible Mouse
- MS-DOS 3.2
- GEM Desktop, GEM Basic
- Supports TTL/CGA/EGA

PORTABLE
- 8MHz Processor/640K
- Supertwist LCD Display
- Single or Dual 3.5" Drives
- 2400 baud Internal Modem
- Parallel & Serial Ports
- 101 Key AT-Style Keyboard
- MS-DOS 3.3

*FULL PC Compatibility ** CALL FOR BEST PRICE***

WE CARRY A FULL LINE OF MACINTOSH PRODUCTS! CIRCLE 268 ON READER SERVICE CARD

CALL TOLL FREE 1-800-468-9044
For Information Call 814-234-2236
Fax 814-237-4450
tcp

GenTech

COMPUTERS

AST RESEARCH
Premium Model 80/90 $1668/2043
Premium 386 Model 140 $3998
COMPAQ COMPUTER
COMPAQ 286/12 Model 40 $3099
COMPAQ 386/20 Model 60 $5822
COMPAQ Portable III/Mod 20 $3729
SHARP COMPUTER
PC 4501/4502/4520 $CALL
TOSHIBA PORTABLE
T1000 Portable $799
T3200/T5100 Portable $2350/4999
WYSE Computer AR Models $CALL
ZENITH
ZF-181-93 20D R 20MB Upgrade $CALL
ZW-183-93 20MB Portable $1979
Super Sport Models $CALL

PRINTERS

IMPACT PRINTERS
BROTHER M1709/M1509 $499/389
HR-40/HR-60 $829/739
EPSON
LX-800 $199 FX-86E $309
FX-286E $469 LQ-500 $339
LQ-850 $539 LQ-1050 $715
EX-800 $420 LQ-2500 $899
FUJITSU
DX-2300 $449 DX-2400 $559
DL-5600C $1759 DL-3400 $699
HEWLETT PACKARD
DESKJET (Budget laser printer) $729
Rugged Writer $1249
Paint Jet $1049
OKINATA
ML 192+ $349 ML 193+ $460
PANASONIC
KXP-1080i $185 KXP 1091i $209

LASER PRINTERS
HP LASERJET II $1799
1 MB/2 MB MEM BD $389/679
OKI Laserline 6 $1429
NEC LC890 Silent Writer $3599
QMS PS-800/810/800 IS $CALL
TOSHIBA Page Laser 12 $CALL

SCANNERS

DATACOPY 730/830 $1269/CALL
DEST 1020/2020 Scanner $CALL
HP Scanjet w/interface $1439
MICROTEK MSF-300C $1599
MSF-300G/400G $2679/3149

MONITORS & TERMINALS

AMDEK 310/410 $139/149
GENIUS 402(1 pg) $995
QUAD (2 pg) $CALL
MITSUBISHI 1400C/1410 $299/399
DIAMOND SCAN $539
NEC MULTISYNC GS $1R5
MULTISYNC II $819
MULTISYNC PLUS/XL $929/2229
SAMSUNN SM200 SEMI-FLAT $RR
CGA/EGA MONITOR $259/356
SONY MULTISCAN 1303 $R69
VETICOM H-1R with CD-3 $CALL
WYSE 700 Monitor with video ctr $749
WYSE 30/WYSE 60 TERMINAL $309/439

FIRMWARE

THESYS MULTIFUNCTION CARD FOR PC/XT LIM MEMORY BOARD EXPANDABLE UP TO 1MB INCLUDES CLK/SER/PAR PORTS $39

ATI VIP VGA GRAPHICS $259
PARADISE
VGA PLUS $259
VGA PROFESSIONAL $419
VIDEO 7 VEGA VGA $285
INTEL ABOVEBOARD 286 $CALL
INBOARD 386 $CALL
DCA IRMA 2/MCA $CALL
NAYES V SERIES MODEM $CALL
DATASHIELD S-85/S-100 SURGE SUPPRESSORS $59/69
SUPERIOR ELECTRIC TRUE UPS Backup Systems $CALL

NETWORKING

3 COM SERVER & SOFTWARE $CALL
FOX 1N NET NETWORK $CALL
NOVELL V 2.1 W SFT LEVEL $CALL
ARCNET CARD $14R
PASSIVE HUB $ 3R
ACTIVE HUB $349
ETHERNET CARD $229
TOPS SOFTWARE FOR MAC $CALL
FLASH CARD FOR IBM $CALL

PLOTTERS

CALCOMP
1023 ARTISAN PLOTTER $CALL
1043G1 PLOTTER $CALL
HEWLETT PACKARD
7570A DRAFTPRO PLOTTER $2995
7475A 6 Pen Plotter $1450
7595 DRAFTMASTER $CALL
HOUSTON INSTRUMENTS
DMP-41/OMP-52 $2249/2999
OMP-56A/56MP $4495/534R
OMP-61/62 $3529/4879
IOLINE
LP3700 PLOTTER $3199
ROLAND PLOTTERS
DXY-880/980 $1029/1329

DIGITIZERS

CALCOMP
23120 (Stylus & 4 Butt, 12 x 12) $429
C23240 12X24 $1850
C25180 12X18 $915
GTCO DIGITIZERS
DP5-2436L $2299
DP5-3648L $2999
HP SKETCH PRO $CALL
KURTA IS/ONE 12X12 W/Cursor $399
IS/ONE 12X17 W/Cursor $679
KURTA FOR MACINTOSH $CALL
SUMMAGRAPHICS
SUMMASKETCH PLUS 12X12 $429
MM1912 12X18 $699

HARD DISKS & TAPES

SEAGATE SPECIAL
4038 $339 (up to 45MB)
5.25" HARD DISK
ST225 (20MB) W/CTR $279
ST238 (30MB) W/CTR $31R
ST4096 (80MB) W/D CTR $699
ST4144 (120MB) W/O CTR $999
NEW 3.5" HARD DISK DRIVE
ST125 (20MB) W/O CTR $249
ST13R (30MB) W/O CTR $3RR
ST157 (40MB) W/O CTR $499
MINISCRIBE 8085 (72MB)/
9128 (110MB) $759/899
MICROPOLIS 1335 (70MB) $869
1355 (140MB) W/ESDI CTR $1199
CORE 310MR W/ESDI CTR $CALL
STORAGE DIM 310MB SCSI DRIVE $CALL
PLUS 20/40MB HARDCARD $CALL
KENNEDY 60MB TAPE SPECIAL $409
MAINSTREAM 60MB TAPE $CALL
ARCHIVE 90MB INT/EXT $599
IRWIN TAPE BACKUP
IRWIN 120/420 20MB $349/399
145/445 40MB $499/64R
*For PS/2: 165/265 60MB $609/609

FOR MACINTOSH

HARD DISK FOR MAC
40MB EXT HARD $699
80MB EXT HARD $1299
60MB INT HARD $729
90MB INT HARD $119R
SUPER MAC VIDEO CARD FOR MAC II
SPECTRUM CARD 256 COLOR $1229
SPECTRUM/24 768K COLOR $2299

CO PROCESSOR & MEMORY

INTEL
80R7-2 $149
8087-1 $21R
80287-8/10 $249/299
803R7-16 $479
80387-20 $709

BROTHER FAX

FAX-100 $899

GENTECH STANDARDS

GENTECH 386 COMPUTERS
386/20 TOWER $2595
80386/20 cpu, 1MB RAM, 1.2MB Dr, Tower Style case, 8 half height Bays, 1 Par/Ser ports, 101 Keyboard

GENTECH 386-16 $1895
80386/16 cpu, 1MB RAM, 1.2MB Dr, 3 bays award bios, one 32-bit, five 16-bit, two 8-bit slots, 1 Par/Ser port, CMOS Technology, 1MB static column RAM, runs Novell, CAD/CAM, Xenix/Unix, 1 year warranty
GENTECH 386-20 $2295
80386/20 cpu, otherwise same as above
TURBO-XT
10MHZ $569
8MHZ $549
8088, 512K RAM, 360KB dr, four bay case, 1 Ser/Par/Clk/Game, Keyboard
GENTECH 286/10
6/10MHZ $875
6/12MHZ $925
80286, 512K RAM, 1.2MB dr, 101 Keybd 1 Ser/Clk/Parallel port, 2 bays
ADD
For Monochrome System $139
For Color EGA System $489
For Color VGA System $CALL
GENTECH LCD-286 $1599
supertwist LCD Screen, 512K RAM, 8 slots, 80287 slot, 1.2MB dr, 2 bays
GENTECH PORTABLE 286 $1229
9" Amber screen, Herculen graphics, 7 slots, 512K RAM, 1.2MB dr, 3 bays

CUSTOMER SERVICE
401-732-5556
ORDERS ONLY
800-843-4302
FAX #
401-732-5518
International Inquiries Welcome
217 Broadway, Suite 615, NY, NY 10007

VISA, MC, COD, CORPORATE PO Accepted
Add 2% for COD Minimum PO $500 Prices subject to change Return authorization required for defective merchandise All returned non-defective merchandise subject to 20% restocking charge

■ BILL MACHRONE

jump through. Ashton-Tate, WordPerfect, and a few others have maintained terminal-based versions of their products so they could have a toehold in the multiuser environment. By and large, however, the products worked and looked far better on their native DOS machines. Yet the usual CEOs could be counted on to trundle out to any introduction of a new Unix machines and speak in glowing generalities about its bright and unlimited future.

Open Look Heyyy, up! March to that podium, boys, and tell 'em how the future depends on this amalgam of AT&T, Sun, and Xerox technology running on $20,000 workstations under Unix. This user interface is spectacularly good, but it runs on the tail, not the dog. It also lacks the participation of several major workstation vendors. Sun likes to smile and shake its head, saying, "Poor DEC. Poor HP. Poor IBM. They just don't understand." Right.

Needless to say, there are countless others. No hardware manufacturer rolls out a new machine today without a gaggle of software manufacturers on hand to testify to its engineering genius and perspicacity in producing this machine. Of course, much of this is an endless dance to maintain a high level of awareness in the investment community. At the podium, the CEOs become like talk-show guests, famous for a Warholesque 15 minutes, or, like latter-day Rula Lenskas and Zsa Zsas, famous just for being famous.

Worse, they seldom have anything intelligent to say about the product at hand, preferring instead to throw a few well-aimed jabs at their perceived enemies and competitors, who may also be on the podium. Every once in a while, however, they actually commit to producing hardware or software or whatever, something that's actually going to be compatible with the new wonder gadget of the day. Then you have to ask yourself how deep their resources really are.

Face it. The next version of the software you count on most is probably late. A major reason it's late is divided resources, and the rest is deep-seated confusion over standards.

Maybe we could make some progress if all the CEOs stayed home for 6 months and declared a moratorium on endorsements.

FOR GROWING BUSINESSES EVERYWHERE
DACEASY™ MAKES A WORLD OF DIFFERENCE!

DacEasy™ Accounting. More Than 400,000 Growing Businesses Worldwide. DacEasy Accounting leads the industry as the number one selling, award-winning program Two-time winner of *PC World's* World Class Award and *PC Magazine's* Editor's Choice, DacEasy Accounting recently was named *InfoWorld's* Product of the Year. Again and again, DacEasy proves that it makes a difference.

Since its introduction in 1985, DacEasy Accounting, feature for feature, has won acclaim as the leader in accounting software. Now Version 3.0 features a new interface with transaction-oriented pull-down menus that makes it think like you think as a business person rather than an accountant. Readily installed with five quick questions, your business accounting is operating within 10 minutes! Choose the predefined Chart of Accounts that are tailored for service or inventory-based businesses, or modify. All seven modules (General Ledger, Accounts Receivable, Accounts Payable, Inventory, Billing, Purchase Order and Forecasting) are fully integrated. Data posted once is automatically posted to all other related modules saving you time and ensuring accuracy as well.

DacEasy Accounting's strength is its capability for generating reports that provide you with fast information and ultimately better management decisions. In fact, it provides you with more than 700 reports and "what if" forecasting scenarios based on three-year historical information — great for projecting expenditures and revenue. And, in addition to the program, you'll find the 460-page documentation is written for ease of understanding with helpful hints, screens and examples.

The DacEasy™ 3.0 Series. A World of Difference in Business Software. Naturally, out of the best-selling accounting program grew the need for related business programs such as DacEasy Payroll. The 3.0 version also features a new intuitive design, pull-down menus, flexible pay periods, current federal and state tax tables, automatic withholdings, printing of checks, W-2's and 1099 forms, and much more. It's no wonder DacEasy is the world's best-selling payroll and personnel management program!

Also new for 1988 is DacEasy Graph+Mate, a RAM-resident program that interfaces with DacEasy Accounting or Payroll. Its easy graphic reporting features pie charts, line charts, bar charts, stacked-bar charts and perspective bar charts. Plus custom file viewing, macros, pop-up calculator and notepad, and more make it the ideal companion.

CIRCLE 220 ON READER SERVICE CARD

DacEasy™. The World's Best Ongoing Customer Support and Training! Disk-based tutorials, FREE Getting Started Support, and a brand new video tutor are just a few of the many products and services Dac offers. Accounting and Payroll Tutors serve as on-screen supplements guiding you through installation to complete set-up with colorful graphics, sounds, primers and examples. And now, you can enjoy at your convenience, DacEasy Accounting Video Tutor, a two-hour VHS tape for a fun way to learn Accounting 3.0. Toll-free Extended Support plans and nationwide DacEasy seminars are also available.

A World of Difference in Price! DacEasy offers the growing business a world of products excelling in performance and price! Priced at $99.95 each are DacEasy Accounting (all seven modules), DacEasy Payroll and DacEasy Graph+Mate. And for a significant savings is the DacEasy BonusPack which includes DacEasy Accounting, Accounting Tutor, DacEasy Payroll and Payroll Tutor, for only $199.95. A great start to computerizing your growing business the DacEasy way.

To order DacEasy™ Accounting, Payroll and Graph+Mate by mail send $99.95 (each), BonusPack $199.95 to Dac Software (address below). (Plus $7.50 Shipping/Tx residents add sales tax/$17.50 shipping outside U.S.)

DacEasy™

Call 1-800-992-7779
(In Canada, Call 519-747-9633)

Dac Software
17950 Preston Road • Suite 800 • Dallas, TX 75252

30-Day Money Back Guarantee. Unconditional guarantee on all products bought directly from Dac Software (less shipping charges). Minimum Hardware Requirements: IBM PC or 100% compatibles. 2 disk drives, MS-DOS or PC-DOS 2.0 or later, 80 column printer able to print 132 column in compressed mode, color or monochrome monitor, 256K memory (384K for Graph+Mate). Trademarks: IBM, PC-DOS, MS-DOS. DacEasy is a trademark of Dac Software, Inc., 17950 Preston Road, Suite 800, Dallas, TX 75252-5740. 5.25" & 3.5" disks available. Copyright © 1988, by Dac Software, Inc. All rights reserved. CODE #104

insilco

We'll Give You Six Solid Reasons Why You Should Be Developing Your Applications In Clarion.

1 Slash Your Total Development Effort... From Prototyping To Completion

You'll get live results fast—even before you write the first line of code. Ideas become running applications in a few hours.

Designer, the front-end application generator, allows you to produce major programs with *no coding*. It eliminates prototyping as a preliminary step because design and source code generation are done concurrently. You can implement a dazzling color screen or a report in minutes. You'll probably never code a screen again!

2 Automatically Generate Commented Source Code For Your Entire Application

The Professional Developer's **Designer** is the most powerful application generator in the industry. It creates structured source code that is fully commented. You can easily add to it, modify it, or just admire it.

And The Professional Developer is a complete development environment with all the tools that you need.

3 Create High-Speed, Bullet-Proof Data Management With Built-In LAN Support

Advanced techniques allow you to tune your data management to fit each application. Use related files, data encryption, memo fields, automatic recovery, and commit and rollback—all without compromising Clarion's high level of performance. And complete LAN features are included so the applications you develop will run on your network without any additional run-time or LAN PACK cost.

4 Interface To Your Own C or Assembler Routines For Special Requirements

The Professional Developer will support special device routines and complex logic written in C and Assembler. You won't have to completely re-write all those existing procedures. You can produce completely open-ended solutions that can grow with your needs or requirements.

5 Produce Executable Programs That Don't Need Run-Time Systems

Compile your application into an .EXE program that will run on a stand-alone computer or workstation so you can distribute your programs without costly run-time systems.

6 Get Started Immediately. You'll Be Productive The First Day.

Although there's a lot of horsepower "under the hood," you'll be producing programs soon after you open the package. You'll find the whole environment friendly and comfortable. PC Week says: "Clarion is easy to learn and easy to use."

All New Version 2.0

The Clarion Professional Developer Is A Total Programming Environment That Runs On Any IBM PC, PS/2, Or True Compatible With 384K Of Memory And A Hard Disk. The Retail Price Is Just $695. NOT Copy Protected.

CLARION PROFESSIONAL DEVELOPER™

And One More.

We'll Give You A Free Preview!

See Your Dealer Or Call Toll Free

(800) 354-5444

For A Free Copy Of Our Tutorial Diskette And Introductory Material

(Or, simply return this coupon).

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

Phone (_____) _____

Mail This Coupon To

Clarion Software
150 East Sample Road, Pompano Beach, FL 33064

Clarion Professional Developer and Clarion Software are trademarks of Clarion Software. Copyright 1988 Clarion Software.

CIRCLE 134 ON READER SERVICE CARD

■ JOHN C. DVORAK

CONFESSIONS OF A POWER USER

As part of his therapy, a reformed John C. Dvorak recounts a time in his life when fast was never fast enough, and the search for speed became an overpowering obsession.

It's hard to explain this feeling of illease. It's called Poweruseritis. It can happen to anyone, though some doctors say it's genetic. Indeed, some people *do* seem predisposed. It wrecks careers. It ruins relationships. And all in all, it turns into a futile exercise in silliness. It struck me last year and I'm still getting over its effects. I may never fully recover.

HOT-ROD REVERIE It began when I decided that a PC AT wasn't good enough. What would it be like, I asked myself, if I had the fastest desktop micro I could piece together? A hot-rod machine. The fastest hard disk, the fastest graphics card, the fastest processor. Michael Dell told me to just use his latest 386: it would be fastest all around. Other vendors said they had this and they had that—all of which were the fastest this and that ever. "You'd better hurry up," said one vendor, "tech writer Steve Satchell is putting together a hot-rod machine too." Not understanding the ill effects of Poweruseritis, which had apparently struck me, I figured he was out to personally embarrass me and my slower machine. There must be others, I surmised. I wrung my hands in a frenzy of paranoia.

Pretty soon it became obvious that no hot-rod machine will be the fastest thing in town for more than a month. Every vendor says it has "something" in the works that will be out next month. As time went by I heard that columnist Jerry Pournelle was trying to piece together a hot-rod machine. Oh no!

I made some calls. Suddenly I was inundated with speed burners. My office was full of them. The Compaq 386, the SIA, the VIP, clones galore. I couldn't ship them back fast enough. At one time I must have had 100 mips (million instructions per second) stacked around the desk. I developed the jitters.

I finally settled on Steve Hui's Everex 20-MHz 386 machine, which just blew all my benchmark tests right off the scale. I equipped it with an OMTI ESDI controller from Scientific Micro Systems, a Control Data Wren drive, a 16-bit Compaq VGA card, and a 9,600-bit-per-second modem. It had to be faster than anything else around, running at close to 5 mips. Hooked up to a Zenith flat-screen monitor, it was a pretty impressive *WordStar* engine. With three different on-line thesauri and 19 TSR utilities I could compute up a real storm. Let's see anybody beat this, I mumbled. The backs of my hands began to itch incessantly.

Then the irony. My thirst for speed had barely been quenched when Steve Hui at Everex said that he would swap out my 20-MHz 386 for a 25-MHz 386 the minute they got some 25-MHz chips from Intel. It should add at least another mip or two, he said. My mouth twitched as I let out a maniacal laugh that echoed in the hallways. I grabbed Hui by the collar: "Nothing can stop me NOW! Hahahahaha!"

POWER USER DETOX That's all I remember. I woke up in a hospital room in the Don Tarbell Clinic. In something of a daze I was slowly weaned off my addiction. At first they'd let me use the Everex at full speed, then they cut the clock speed down further and further until I could eventually be moved to a 6-MHz AT and finally to an IBM PC-XT with a 10MB hard disk. I was reacquainted with an Apple II, an old Commodore PET, and a couple of handmade machines using chips long forgotten. They are my friends. I even loaded a couple of cassette tapes into them. It took a couple of tries.

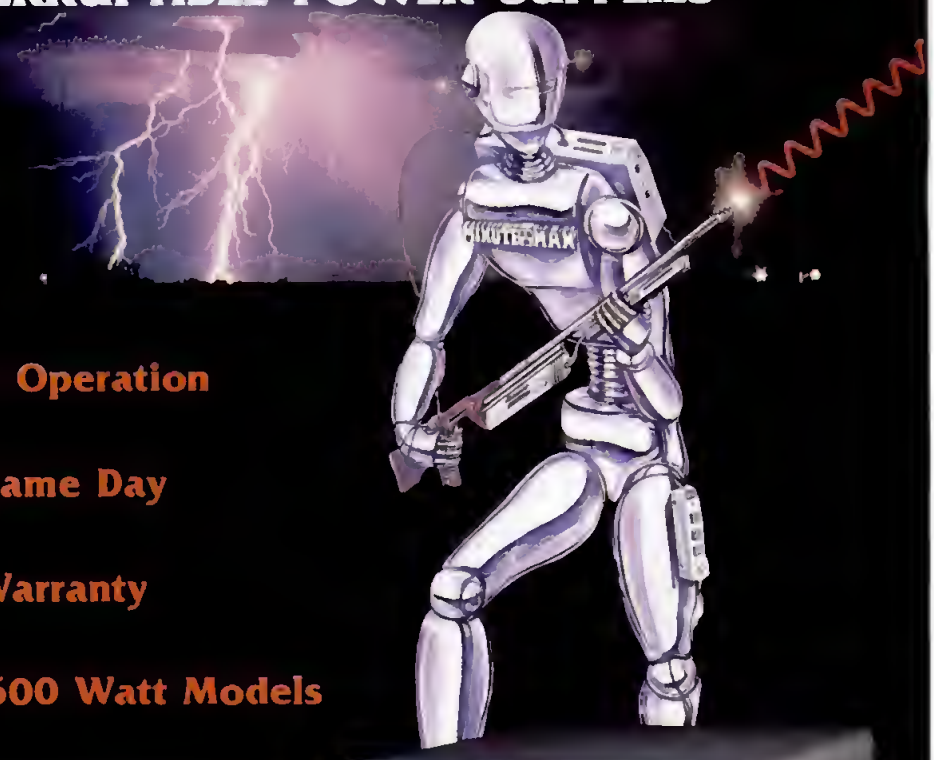
I left the clinic a few weeks ago, calm, refreshed, and with a brighter outlook on life. I now see that normal people do get true functionality from an IBM PC-XT or an Apple II.

They aren't "idiots who can't keep up the pace," like I used to think. I just have to remember what I was taught at the clinic and what I say in front of my regular weekly group: "I am a Power User. Forgive me. As a recovering Power User, I now know I can fight this disease." Then I drive home in my Nash Metropolitan.

Illustration: Cathie Bleck

MINUTEMAN®

UNINTERRUPTIBLE POWER SUPPLIES



- **Fully Automatic Operation**
- **Order — Ship Same Day**
- **Full One Year Warranty**
- **250 Watt to 1600 Watt Models**

TOTAL POWER PROTECTION

- **Blackouts** — Enables user to operate during complete loss of power.
- **Brownouts** — User is protected from low AC voltage below 102 volts.
- **Overload Protection** — Automatic shutdown in overload situation to protect UPS from inverter burnout.
- **Overvoltage Protection** — UPS runs on inverter (117 volts) when AC voltage exceeds 132 volts.
- **Surges/Spikes** — Clamps transients above 200 volts with an energy rating of 100 joules or less.
- **EMI/RFI** — Three stage filtering for clean AC power.
- **Syncronized Sinewave*** — Eliminates voltage reversal to input or your equipment.
- **1 Millisecond Transfer Time*** — This includes detection and transfer so your machine never notices loss of electrical power.
- **Two Audible Alarm Levels** — Notifies user of battery usage and two (2) minute warning.
- **LED Display** — Informs user of operation mode, power utilized on AC, plus "On Battery" and battery power status.
- **Alarm Silencer** — Enables user to silence alarm for quiet continued operation during battery operation.
- **Optional Signal Port** — Enables UPS to notify computer of loss of AC power to allow computer to backup or shut down.

*250 watt and 500 watt units offer 4 msec transfer time, PWM wave form.

Suggested Retail

250 WATT	120 Volt	$ 359.00
300 WATT	120 Volt	$ 549.00
500 WATT	120 Volt	$ 699.00
600 WATT	120 Volt	$ 899.00
1200 WATT	120 Volt	$1499.00
1600 WATT	120 Volt	$1999.00

230 Volt Units Also Available

PARA SYSTEMS, INC.

1455 LeMay Drive
Carrollton, Texas 75007

Telephone:
(214) 446-7363

1-800-238-7272

FAX: (214) 446-9011

TELEX: 140275 OMEGA

CIRCLE 381 ON READER SERVICE CARD

■ JOHN C. DVORAK

INSIDE TRACK

Action at Lotus abounds as employees sell off stock; Release 3.0 of 1-2-3 delayed. Coincidence?

The industry is abuzz over the sell-off of Lotus stock last February by many of its top executives. If all the facts are correct, there are more than a few interesting observations to be made. First off, who sold what? Jim Manzi, the president, sold nearly 30 percent of his holdings, vice president Palmer True sold 99 percent of his holdings, and Susan Yeomans, another VP, sold 96 percent of her holdings. Edward Belove, VP, sold 100 percent of his holdings and Dan McMillan sold 98 percent of his holdings. I could go on. **Over $15 million worth of Lotus stock was dumped, er, sold.** That was all in February. On March 23, the company announced it would delay the release of Version 3.0 of *1-2-3* for at least 6 months. The stock took a dive.

The SEC supposedly is looking into this, but Lotus people say the sell-off and subsequent announcements were **a coincidence.** According to one report all this was just a lot of previously executed stock options being sold off for one reason or another. Lotus general counsel Tom Lemberg was quoted as saying that the officers who sold the stock in February **"had no way of knowing that release 3.0 would be delayed in March."** OK, let's give them the benefit of the doubt and believe that assertion.

If that assertion is true, then you have to wonder **what the heck is going on** at Lotus if the progress of its number-one priority project isn't being monitored by the executives who run the company. What are they doing with their time? You also have to wonder what kind of confidence they have in the future to be selling off their stock so **enthusiastically.** I'm sure this activity pleases Messrs. William Gates III and Philippe "Genghis" Kahn to no end as sales of *Excel* and *Quattro* boom. Once again, it's starting to look like **a new ball game** is emerging in the spreadsheet arena. Remember a company called VisiCorp?

Trying to Cheat Reality Dept.: Recently I got hold of an Atari Mega4. It's the newest version of the 68000-based ST series, but with 4MB RAM. I was sent a program called *PC-Ditto* from Avant-Garde Systems in Jacksonville, Florida. *PC-Ditto* is a software emulator that tells the 16-MHz 68000 chip inside the Mega4 to emulate the 8086's instruction set. **I was shocked** to discover that it worked. Once installed I could shove a DOS diskette into the Atari, boot MS-DOS, and run most PC applications. I noticed, though, the applications ran (putting it mildly) **sluggishly.** So I ran the PC Labs benchmark tests and other test programs on the machine. Most tests saw the emulator as a virtual machine and gave me an accurate indication of its speed as a PC clone. **It was terrible.** It ran at 1/5 the speed of an already **lethargic** old 4.77-MHz PC-XT. Man, that's slow! Assuming that the 68000 clicking along at 16 MHz is at least as powerful as an 8-MHz 80286 machine, this means that the emulator saps the power of the chip by a factor of about 20 to 1 depending on how you calculate these things. That means the machine is effectively running at 5 percent of its power.

It's hard to tell if the Avant-Garde 95-percent power drain is good or bad. In the past we've not seen emulators for the simple reason that they are **so slow** that vendors won't release them. For all I know, the Avant-Garde software is a screamer. The only other emulators I've played with emulated 6502 code on a Macintosh. No benchmark tests were available to test their efficiency.

This interests me because **emulation is the key** to the potential sales of RISC-based microcomputers in our computer marketplace. If some new cure-all RISC chip claims to be a 10-mips chip, it will be sold as having twice the power of a 24-MHz 80386 chip. This may be meaningless if under 8086 emulation it runs at 5-percent power or .5 mips—the speed of a turbo XT. **This isn't progress, it's marketing.** Get those benchmark test disks out and keep them handy.

While on the subject of marketing. Half of 1987 and most of 1988 has been spent discussing two standard bus architectures: the old PC bus and the Micro Channel or MCA bus. The **current consensus** is that both will live forever and nobody really cares about the MCA bus. The only big-time booster for the MCA bus has been our editor-in-chief and publisher, Bill Machrone, who, because he likes most things that are nifty and new, **was largely ignored.** I've watched this debate from the sidelines, but I see the same old trend. Nobody shows any interest at first, then it's like the formation of a crystal in a chem lab beaker: once a seed is dropped into the liquid, everything changes instantly. The seed, in this case, is Tandy's announcement of an MCA bus. I figure that by this time next year we'll be talking about the old bus in terms of how long it has to live. "A week? Maybe two?" When the market **starts to slide,** you watch them **bail out** of that old bus as fast as they can.

Final Note Dept.: I finally got to play with **HP's New Wave** graphical interface for the IBM PC. While it may never see the light of day if Apple has its way, let me compliment the programmers at HP for turning the *Windows Executive* into a work of art. This interface is what it's all about. While the metaphor could have been a little less like a Mac copy, the implementation is **spectacular.** It's worth the effort to find someone who can give you a demonstration.

No Matter How It's Protected, Be Sure You Can Back It Up.

Several products can back up protected software. But only two are tough enough to handle even the trickiest protection schemes.

Copy II PC® for just **$39.95,** backs up more protected software than any other program. What's more, it can remove copy protection already on your hard disk. *PC Magazine* calls it the "easiest of such programs to use." And now, with our menu-driven Noguard, it's a snap. Copy II PC easily handles Lotus 1-2-3 and over 100 other top-selling programs.

Now removes Superlok, Everlok and Prolok copy protections.

For the ultimate solution, try the **Copy II PC Deluxe Option Board.** For just **$159,** it gives you the same advanced technology used by commercial disk duplication firms. *PC Magazine* reported it "could not find a program this board couldn't handle." It's so powerful, in fact, it even lets you read and write Mac data files in a IBM PS/2 Model 25 or 30, or a PC or AT with a 3.5" internal drive.

No matter how it's protected, be sure you can back it up. **For the dealer nearest you, or to order direct, call (503) 690-8090,** M-F, 8 a.m. to 5 p.m. (West Coast time).

Central Point Software
INCORPORATED
15220 N.W. Greenbrier Pkwy. #200
Beaverton, Oregon 97006
(503) 690-8090 Sales/Info
(503) 690-8080 Tech Support

Copy II PC
Copy II PC Deluxe Option Board

Copy II PC® and Copy II PC Deluxe Option Board are trademarks of Central Point Software. All other company and product names are trademarks of the company or manufacturer respectively.

CIRCLE 160 ON READER SERVICE CARD

"There's No Reason To Look Beyond PC TOOLS"

–PC Magazine, Editor's Choice Award, Two-Time Winner

*Data Recovery · **Fast** Hard Disk Backup · Disk Management*

Now we've given you even more reason–PC Tools™ Deluxe.

PC Tools Deluxe gives you all the best features of **Fastback,™ Norton,™ XTREE,™ Mace,™ Sidekick,® Lightning™** and **Disk Optimizer**–a $700 value–for just $79.

Other utilities may claim they "do it all," but only PC Tools Deluxe delivers:

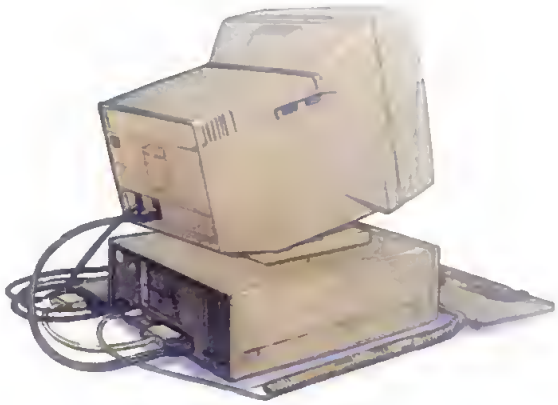
- A DOS shell so complete 80 Micro called it their **"overwhelming choice based on versatility, ease of use, and cost."** • The best UNDELETE available–instead of merely "guessing," it recovers all data even on fragmented files.
- HARD DISK BACKUP as fast and every bit as reliable as Fastback. • The leading UNFORMAT for hard disks and floppy disks, enabling you to recover from many disk disasters.
- PCFORMAT for safe formatting of floppy and hard disks.
- A quick, reliable DISK CACHING utility for speeding up disk access.
- A ***fast*** COMPRESS feature that like Disk Optimizer dramatically improves hard disk performance. • And a better resident mini WORD PROCESSOR than Sidekick, including word wrap, search/replace, formatted page printing and more.

Before you buy any of these other utilities, take a look at PC Tools Deluxe. Like PC Magazine, you'll find there's no reason to look any further. **For the dealer nearest you, or to order direct,** call (503) 690-8090, M–F, 8 a.m.–5 p.m. (West Coast time).

CIRCLE 120 ON READER SERVICE CARD

Central Point Software
INCORPORATED
15220 N.W. Greenbrier Pkwy. #200
Beaverton, Oregon 97006
(503) 690-8090 Sales/Info
(503) 690-8080 Tech Support

PC Tools is a trademark of Central Point Software. All other product names are trademarks of their manufacturers.



New Hope for Unsociable Computers.

Just a few short minutes with CROSSTALK® Mk. 4 can start your PC communicating with most anyone.

You can open up a world of new possibilities for your PC through our advanced communications software–and you don't have to be a genius to do it.

With a phone line and modem, CROSSTALK Mk. 4 can get your PC into a dial-up information service like CompuServe® with a single command. Our scripts make it as easy as filling in a few blanks on a screen.

Want to exchange words with other PCs? You can create your own command scripts to simplify and automate entire communications sessions.

When you're ready for bigger worlds, you can break down barriers between your PC and minis and mainframes with CROSSTALK Mk. 4. It emulates over 20 popular terminals, supports the most-used protocols, and helps drive IRMA™ or Smart Alec™ interface boards through a single set-up screen.

For advanced communicators, CROSSTALK Mk. 4 handles concurrent sessions with multiple devices. Its high-level programming language, CASL,™ helps you create customized, menu-driven user interfaces and other applications programs.

As you see, we make communication as simple or sophisticated as you need to get the most out of your newly compatible PC. See your dealer, or contact us.

CROSSTALK® Mk.4

CROSSTALK COMMUNICATIONS / 1000 Holcomb Woods Parkway, Roswell, Georgia 30076 / (800) 241-6393

A Division of Digital Communications Associates, Inc dca

CROSSTALK is a registered trademark of Digital Communications Associates, Inc. / CASL, IRMA and Smart Alec are trademarks of Digital Communications Associates, Inc. / CompuServe is a registered trademark of CompuServe, Inc., an H&R Block Company

CIRCLE 278 ON READER SERVICE CARD

■ JIM SEYMOUR

386 PCs: REDEFINING THE WORKSTATION

With bigger and better monitors, faster and larger hard disks, and simplified networking capabilities, 80386-based PCs stand a good chance of being the workstations of the future.

Sometimes change sneaks up quietly, gradually taking over and, without our noticing, modifying fundamental aspects of the way we work and the form and function of the tools we use. And sometimes change jumps out of the shadows and bops you on the head, mugging you and altering your life before you realize what's happened.

Both models of change have been at work in the PC business. The rapid *workstationization* of personal computers that has been happening with a quiet inevitability is now coming in a sudden rush.

The April release of Sun's new 386i series hybrid PC/workstation underscored the trend. But the movement was under way long before Sun rolled out the BMW soundalikes.

The term "technical workstation" has been as loosely defined as any in computing. But over the past couple of years, a consensus has formed about what a workstation is and how it differs from a PC.

That emerging definition of a workstation includes a large, high-resolution monitor with graphical displays under a windowing system; a fast, powerful 32-bit microprocessor; at least 2 to 4MB of RAM installed (with the potential to add at least 8 to 16MB more), a fast, large-capacity hard disk; the ability to run the Unix operating system; and the capability to make networking easy, probably by including built-in network connections for a widely used standard such as Ethernet.

Does that sound . . . ummm . . . a bit familiar? Like maybe today's 80386-based personal computers?

CHALLENGING THE MYSTIQUE

The workstation mystique has endured, no matter how well 386-equipped PCs measure up. But look for a moment at just how well the current crop of high-end 386s meet that workstation definition:

■ There's a clear move toward larger, higher-resolution displays for high-end PCs—though for now we've unfortunately stalled out on the so-so Video Graphics Array standard. IBM's new larger, higher-resolution 8514 display will be the next benchmark in display quality. At $3,000 for the 8514 display and card, it's too expensive to really become a standard, but it will get a lot of attention and accelerate the trend toward bigger, better monitors.

■ A bigger character-only display would be a waste, so a graphical standard for that display is equally important. *Windows* 2.0 and *Windows/386* provide that windowing-display glue. The Presentation Manager in OS/2, Version 1.1, will extend that standard's franchise, despite the stink bombs dropped by Apple's suit against Microsoft and Hewlett-Packard—and implicitly against IBM—over the look and feel of *Windows*.

■ The Intel 32-bit 80386 chip found in current high-end PCs is giving Motorola's 68000-series microprocessors (the dominant choice for workstations) a run for the money. Vendors are supporting the Intel chip with only 1 or 2MB of RAM in base-price configurations, but that's largely a function of the artificially skewed DRAM memory-chip prices we're seeing. Most 386 PCs accept several megabytes of RAM on their motherboards, and all accept substantial additional doses of RAM on plug-in memory cards.

■ Almost every 386 PC is now offered with a large, fast hard-disk option. The 130–150MB CDC Wrens with their sub-20-millisecond access times, supported by ESDI interfaces, are popular choices, and they outperform the kinds of hard disks previously seen as standard for workstations.

■ The Santa Cruz Operation's Xenix, plus Unix products from Interactive Systems, Locus Computing, and others, have become well-respected, widely available operating systems for 386 PCs.

■ And while network connectors built into PCs remain rare birds, the proliferation of plug-in network cards that support every possible protocol and wiring scheme makes networking easier and more versatile with PCs than with most workstations.

Does this mean PCs have turned into workstations? And does that matter?

Illustration: Cathe Bleck

■ JIM SEYMOUR

It matters a great deal. And not just because, as the cynics will note, workstation-level PCs run $10,000 and more, while good, fully equipped AT-based clones have fallen below the $2,000 level.

Until now, the differences in power and function between PCs and workstations forced us to adopt either a sloppy myth or a sloppy desktop. The sloppy myth was that people who needed and used workstations did nothing but technical computing all day long and had little need of other functions.

The alternative—the sloppy desktop—reflected the reality that people who do technical computing do *many* kinds of work, much of it better handled by MS-DOS productivity programs . . . and so they plopped a PC down on their desks next to the workstation.

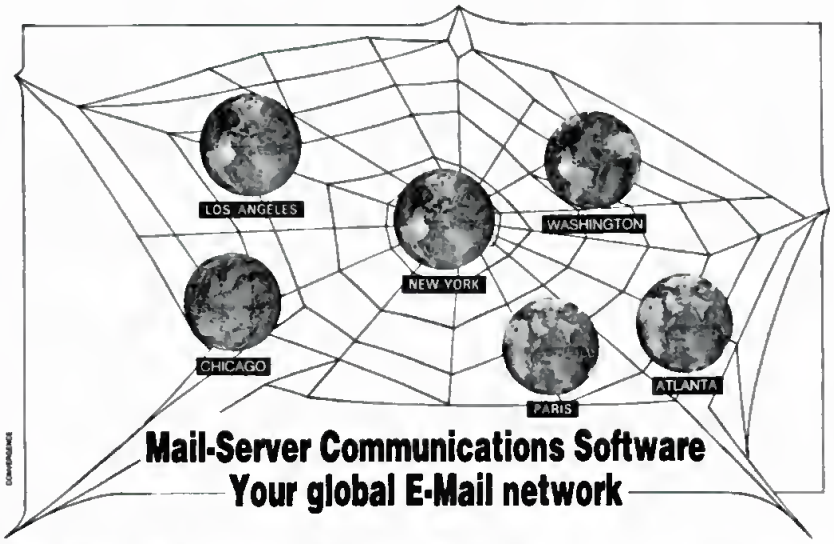
Apple has made much of the discovery that engineers write letters and use spreadsheets, hyping the Macintosh II as an all-purpose workstation. In truth, the Mac II's a little underpowered as a Unix-driven technical workstation, though it's a lovely productivity machine. But high-end 20-MHz 386 PCs from IBM, Compaq, Dell, ALR, and others make very good dual-purpose DOS/Unix workstations. The new Sun 386i goes a step further.

■ Apple has made much of the discovery that engineers also write letters and use spreadsheets, hyping the Macintosh II as an all-purpose workstation.

A WELCOME CONVERGENCE

There's no longer a need for genuine power users to compromise by cluttering the desk with two machines. And we won't need to give up the richness and breadth of sophisticated DOS applications to get the muscle of Unix technical applications in finance, engineering, or science. We'll be able to have both systems on our machines, running simultaneously, and get the best of both worlds.

Which is why the workstation-PC convergence is as welcome as it is overdue. And why the trend toward workstationization of PCs is going to become a very noisy one indeed.



Mail-Server Communications Software
Your global E-Mail network

LINK WORLDWIDE OFFICES ON YOUR PC's...

Let Mail-Server communications software create a permanent and vital link between your locations all over the US or all over the globe, using any Hayes compatible modem. Link together headquarters, branch offices and outside salespersons through their PCs, with or without human intervention, even when your mail room is closed for the day. Day and night, Mail-Server collects and delivers your messages and files: it's your full time electronic post office.

... with the ELECTRONIC-MAIL FEATURES ...

Mail-Server creates mailing lists and sends files and messages to multiple locations at once.

Mail-Server maintains distribution lists and delivers mail to multiple mailboxes at the same location.

Mail-Server retrieves E-Mail from remote PC's.

... of MAIL-SERVER INTEGRATED COMMUNICATIONS SOFTWARE.

Mail-Server features automated, unattended, background, remote communication; terminal emulation and much more!

Mail-Server's encrypted, multi-level passwords restrict remote access to your data.

Mail-Server, brought to you by 3X, a leading European software manufacturer, has been specially designed to accomodate differences in international phone systems.

AUTOMATICALLY and UNATTENDED

With Mail-Server, All communications tasks can be executed AUTOMATICALLY and UNATTENDED, whatever PC application is running at the time. CALLS can be scheduled to take place, UNATTENDED, at a pre-scheduled date and time, or every day, at the same time, when phone rates are at their lowest.

For $195, Mail-Server lets your company use its PC's to enter the era of distributed information.

For additional information call 3X USA today to build your company's global network.

U S A

3X USA Corp.
One Executive Drive,
Fort Lee, NJ 07024
Phone: (800)327-9712
(201)592-6874 (N J)
Fax: (201)592-0908

CIRCLE 484 ON READER SERVICE CARD

COMPLETE 12 MHz ZERO-WAIT 286 SYSTEM

WITH 32MB HARD DRIVE!

Can you believe it? *Yes you can!*

32 MB hard drive. 12 MHz ZERO Wait State. Fully AT compatible. Our *complete* '286 system ready to plug in and fly right out of the box! At the amazing price of only $1,295!

How is it possible? By buying direct from the manufacturer that's how. ZEOS International offers you the finest, best-backed fully AT compatible systems available . . . at *factory direct* prices.

We think you'll agree, this is the very best value you'll find anywhere.

And every ZEOS® system is fully assembled, burned-in and tested in our own laboratories. We would like to build one for you. Give us a call today!

OTHER ZEOS OPTIONS:

- Basic System Only: Everything except a hard drive. $995
- Complete *60+MB* hard drive system! Only $1,595
- EGA Upgrade. 14" EGA color monitor with ZEOS EGA card. Fully tested. Add $495
- Many other drives and options available. Call Toll Free for details, 800-423-5891.

ZEOS® Customer Assurance Program

Compare not only our features but the ZEOS® Customer Assurance Program as well: 1. Full refund within 30 days of shipment if you are not absolutely satisfied. 2. One full year limited warranty on parts and labor. 3. Federal Express replacement of any failed parts for your first year of ownership.

ONLY $1,295.00

NEW! ZEOS® '386 Motherboards!

ZEOS® 80386 motherboards, 16 or 20 MHz, Zero-Wait state. Up to 16MB of 32-bit memory *on board.* Plus *on board* options include Weitek 1167 Math Co-processor, 80387, 80287, FDC and SCSI HDC. Ideal for upgrades and OEM systems. Only $1395.00

STANDARD FEATURES INCLUDE:

- 12" High Resolution Amber Screen TTL Monitor with Tilt & Swivel base. Easy on the eyes!
- 80286 CPU Zero-Wait State Motherboard with 8 I/O slots and socket for 80287 Math Co-processor.
- 6/12 MHz Dual Speed, Keyboard Selectable, Zero Wait-State. Phoenix BIOS!
- Deluxe AT-style Case, Security Keylock, Reset Button, LEDs.
- Full 101 key AT-style Keyboard, Mechanical Tactile with Pleasant "Click" Feel.
- Heavy Duty 200W Power Supply.
- Real Time Clock/Calendar with Battery Backup.
- 512K, *80ns* Memory expandable to 1MB on the Motherboard.
- Hard and Floppy Drive Controller.
- Serial and Parallel/Printer Ports.
- 1.2 MB High Capacity Floppy Drive.
- 32MB hard drive.
- High Resolution Monochrome Graphic Card.
- FCC approved.

And More!

AT is a registered trademark of IBM Corporation

Due to currency fluctuations and other factors beyond our control, prices are subject to change without notice

Call for complete warranty details.

In Minnesota Call: 612-633-4591
FAX Orders Dial: 612-633-2310

VISA MasterCard COD

ORDER NOW TOLL FREE 800-423-5891

CIRCLE 723 ON READER SERVICE CARD

ZEOS INTERNATIONAL, LTD
530 5th Avenue NW, Suite 1000
St. Paul, MN 55112

Compuclassics

1 800 328-4473 US 1 818 705-1895
1 800 231-6603 CA

SOFTWARE

ALDUS
Pagemaker 499.00
AMERICAN SMALL BUSINESS
Design Cad 165.00
Design Cad 3D 195.00
ASHTON TATE
Multimate II 289.00
Dbase III Plus 409.00
Rapidfile 219.00
Framework II 429.00
Chartmaster 239.00
Master Graphics 379.00
AUTODESK
Autosketch Enhanced 95.00
BANNER BLUE
Org Plus 95.00
BLOC DEVELOPMENT
Formtool W/Greatest Hits 95.00
BOEING COMPUTER SERVICES
Boeing Graphics (3D Color) 219.00
BORLAND
Turbo Database Toolbox 65.00
Turbo Graphix 65.00
The Developer's Library 235.00
Turbo Lightning 65.00
Reflex 90.00
Superkey 65.00
Turbo Prolog 95.00
Turbo Basic 65.00
Turbo C 95.00
Sidekick 59.00
Sidekick Plus 119.00
Eureka 99.00
Quattro 149.00
Paradox V 2.0 405.00
BORLAND INTERNATIONAL
Turbo Pascal 4.0 65.00
Turbo Tutor 4.0 45.00
BOURBAKI
1 Dir PLUS 65.00
BREAKTHROUGH
Timeline V 3 CALL
Timeline Graphics 119.00
BRODERBUND
Print Shop 39.00
Memory Mate 45.00
BUTTONWARE
PC File + 45.00
CENTRAL POINT
Copy II PC 29.00
Copy II PC Option Brd Dlx 115.00
PC Tools Deluxe 45.00
COMPUTER ASSOCIATES
Supercalc IV 299.00
Superproject Expert 459.00
ACCPAC Easy 69.00
ACCPAC BPI 295.00
Silverado 99.00
CONCENTRIC DATA SYSTEMS
R & R Relational Report 115.00
CONSUMER SOFTWARE
Quet 75.00
CORE INTERNATIONAL
Corelast 99.00
DAC
Easy Accounting 2.0 59.00
Easy Payroll 2.0 40.00
Bonus Pack 109.00
DELTA TECHNOLOGY
Direct Access 59.00
DIGITAL MARKETING
Grammatik II 59.00
DIGITAL RESEARCH
Gem Desktop 32.00
Gem Draw Plus 179.00
Gem Collection 89.00
Gem Word Chart 119.00
Presentation Team 295.00
Desktop Publisher 195.00
DIGITALK
Smalltalk V 79.00
Smalltalk V 286 149.00
EXECUTIVE SYSTEMS
X Tree 39.00
X Tree Pro 99.00
FIFTH GENERATION
Fastback 92.00
Fastback Plus 105.00
FOX SOFTWARE
Foxbase Plus 215.00
Foxbase Multi user 299.00
Foxbase Runtime Unlimited 279.00
FUNK SOFTWARE
Sideways 40.00
GENERIC SOFTWARE
Generic Cad 59.00
Dot Plot 29.00
Auto Convert 29.00
Auto Dimension 29.00
3D Solid Modeling/Rendering 179.00
HAYES
Smartcom III 165.00
IBM
Displaywrite IV 299.00
DOS 3.3 95.00
LATTICE
Lattice C Compiler 245.00
LEADING EDGE
Word Processor W/Spell/Merge 85.00
Word Processor V1.5 125.00
LIFETREE
Volkswriter III 169.00
LIVING VIDEOTEXT
Grandview 169.00
LOTUS DEVELOPMENT
Symphony V 2 489.00
Manuscript 369.00
Lotus 1-2-3 329.00
Hal 110.00
Freelance Plus 389.00
Graphwriter 369.00
Metro 75.00
MATHSOFT
Mathcad 2.0 239.00
MAXTHINK
Max Think 49.00
MECA
Managing Your Money 4.0 125.00
MERIDIAN TECHNOLOGY
Carbon Copy Plus 109.00
MICROLOGIC
Tornado W/Library 79.00
MICROPRO
Wordstar Professional 4.0 259.00
Wordstar 2000 Plus 245.00
MICRORIM
Rbase for Dos 509.00
MICROSOFT
Pageview 39.00
Quick C 99.00
Word 239.00
Quickbasic 99.00
C Compiler 309.00
Fortran Compiler 309.00
Cobol Compiler 469.00
Macro Assembler 105.00
Learning DOS 39.00
Flight Simulator 39.00
Excel 329.00
Windows 386 145.00
PC Works 145.00
MICROSTUF
Crosstalk XVI 99.00
Crosstalk Mark 4 129.00
MIGENT
Ability Plus 145.00
NANTUCKET
Clipper 399.00
NASHOBA
Nutshell Plus 169.00
NEW ENGLAND SOFTWARE
Graph-In-The-Box 65.00
NORTH EDGE SOFTWARE
Timeslips III 119.00
PAPERBACK SOFTWARE
VP Info 99.00
VP Planner 59.00
VP Planner Plus 99.00
PATTON & PATTON
Flowcharting II Plus 155.00
PAUL MACE
Mace Utilities 59.00
PC SUPPORT GROUP
Lightning 59.00
Lucid 3D 59.00
PEACHTREE
Complete Accounting II 199.00
PERSOFT
Smarterm 240 219.00
Referee 49.00
PETER NORTON COMPUTING
Norton Utilities 55.00
Norton Utilities Advanced 79.00
Norton Commander 39.00
POLYTRON
Polywindows Desk Plus 49.00
Polyboost II 45.00
PRIME SOLUTIONS
Disk Technician 65.00
Disk Technician Plus 95.00
QUAID SOFTWARE
Copywrite/Zerodisk CALL
QUARTERDECK
Desqview 2.01 75.00
RIGHTSOFT
Rightwriter 59.00
SCITOR
Project Scheduler Network 379.00
ASK SAM SYSTEM
Ask Sam 255.00
SIMON & SCHUSTER
New World Writer 79.00
Typing Tutor IV 32.00
SOFTCLONE
Mirror II 39.00
SOFTLOGIC SOLUTIONS
Disk Optimizer 42.00
Cubit 42.00
Double DOS 42.00
@ Liberty 119.00
Magic Mirror 60.00
SOFTWARE MASTER
Flash 5.0 49.00
SOFTWARE PUBLISHING
PFS Professional Publisher 65.00
PFS Professional Write 119.00
PFS Professional File 140.00
PFS Professional Plan 99.00
PFS First Choice 79.00
Harvard Total Project II 375.00
Harvard Graphics 339.00
SOFTWARE TOOLS
Viewgen 95.00
SYMANTEC
Q & A 235.00
TRAVELLING SOFTWARE
Laplink Plus 90.00
TURNER HALL
Note-It-Plus 59.00
SQZ Plus 69.00
Cambridge Spreadsheet Analyst 69.00
UNISON WORLD
Printmaster Plus 32.00
Art Gallery I & II (Each) 22.00
Newsmaster 55.00
WALLSOFT
The Documentor 199.00
dFlow 89.00
WISEWARE
Prime Time 65.00
WORD PERFECT CORPORATION
Word Perfect 5.0 209.00
Word Perfect Network Server 305.00
Word Perfect Network Add-On 75.00
Plan Perfect 175.00
Data Perfect 275.00
Word Perfect Executive 119.00
Word Perfect Library 59.00
WORD TECH
DBXL Diamond 99.00
Quicksilver Diamond 345.00
ZEROE
Ventura Publisher 1.1 519.00

HARDWARE

ARRAY TECHNOLOGIES (ATI)
Ega Wonder 189.00
AST RESEARCH
Premium 286 Model 140 Computer 2749.00
Premium 286 Model 80 Computer 1645.00
Advantage Premium 512K 335.00
Six Pack Plus 384K 249.00
Six Pack Premium 256K 219.00
Rampage AT 512K 395.00
AST 5251/11 Enhanced 579.00
Hot Shot 395.00
ATD ZUCKER
Monographics Short Card 79.00
Memory Expansion 384K 175.00
Modular I/O Bare P/S/Clock 75.00
Clock Board Standalone 35.00
1200 Baud Internal Modem 65.00
CITIZEN
1200 229.00
MSP 40 349.00
MSP 15 429.00
MSP 20 379.00
COMPUTER ACCESSORIES
P15 Power Director 99.00
DIGITAL COMMUNICATIONS
IRMA 3278 799.00
EVEREX
EV 1800 8MHZ AT System 975.00
EV 1800 10MHZ AT System 1049.00
Evercom II 1200 Modem 129.00
Evercom III 2400 Int Modem 225.00
Magic I/O For AT 59.00
RAM 3000 EMS Expansion 119.00
FIFTH GENERATION
Logical Connection 256K 349.00
HAYES
Smartmodem 1200 325.00
Smartmodem 1200B W/Software 325.00
Smartmodem 2400 489.00
Smartmodem 2400B W/Softwars 489.00
HERCULES
Hercules Monochrome Plus 199.00
HEWLETT PACKARD
Laserjet II 1799.00
Fonts for Laserjet II CALL
INTEL
Above Board PC 64K 269.00
Above Board 286 W/512K 369.00
8087-3 (5MHZ) 119.00
80C87-2 (8 MHZ) 175.00
80207 (6 MHZ) 199.00
80827 (8 MHZ) 299.00
80207 (10 MHZ) 349.00
INTERNATIONAL BATTERY
AT Replacement Battery 27.50
AST Six Pack Battery 3.50
IRWIN MAGNETICS
120 XT 20MB Internal 479.00
125 AT 20 MB Internal 479.00
KENSINGTON
Masterpiece 99.00
Masterpiece Plus 109.00
Masterpiece Remote 115.00
LOGITECH
Logimouse C7 95.00
Logimouse Hi Rez 95.00
Logimouse C7 + Paintbrush 135.00
Logimouse W/Cad/Paint 145.00
Publisher Mouse 155.00
MICROSOFT
BUS Mouse W/Paintbrush 115.00
BUS Mouse W/Windows 155.00
Serial Mouse W/Paintbrush 115.00
Serial Mouse W/Windows 155.00
MICROSPEED
Fast 88 79.00
MIGENT
Pocket Modem 129.00
MOUSE SYSTEMS
PC Mouse BUS Plus 99.00
PC Mouse Serial Plus 99.00
NEC HOME ELECTRONICS
Multisync II 929.00
Multisync Plus 1055.00
NEC INFORMATION SYSTEMS
P 760 Printer 689.00
P 660 499.00
P 2200.00 COL 389.00
OKIDATA
Microline 102 269.00
Microline 192 Plus 375.00
Microline 193 Plus 549.00
Microline 292 W/Interface 549.00
Microline 293 W/Interface 749.00
Laserline 6 1539.00
PARADISE
Autoswitch 480 159.00
Modular Graphics Card 129.00
VGA Plus 259.00
PLUS DEVELOPMENT
Hardcard 20 MB 959.00
Hardcard 40 MB 915.00
POLAROID
Polaroid Paleffs 1499.00
Polaroid Palette Plus 2399.00
PRACTICAL PERIPHERALS
Practical Modem 1200 Internal 99.00
Practical Modem 1200 SA 119.00
Practical Modem 2400 INT 165.00
Practical Modem 2400 SA 199.00
SAMSUNG
Amber Monitor 95.00
SEAGATE TECHNOLOGY
ST 251 40MB No Controller 439.00
ST 225 20MB W/Controller 299.00
ST 238 30MB W/Controller 349.00
ST 4038 30MB For AT 529.00
SUMMAGRAPHICS
Summasketch 1201 Plus 419.00
TOSHIBA
T 1000 Laptop 1059.00
T 3100-20 Laptop 3699.00
P321 Prinir 549.00
P341 E SL 759.00
P351 Model 2 1109.00

ADVANTAGES

- Orders placed before 3 p.m. (PST) shipped same day
- We welcome corporate accounts
- Free technical support
- Immediate replacement of defective goods
- Bulk discounts
- One million dollar inventory
- Immediate shipment on purchase orders from qualified institutions (schools and universities included).
- No hidden charges

TERMS:

All prices subject to change without notice. We do not guarantee compatibility. No surcharge for VISA or MasterCard. 2% surcharge for American Express. No returns without RA#. Short shipments must be notified within 48 hours. 15% restocking fee on non-defective goods. $3.50 C.O.D. charge. Shipping $4.50 per item, less on bulk orders. ($8.50 Blue Label.) (Higher for some hardware items.)

Call for prices for any item not included in this price list.

Order desk & technical support open
8 a.m. to 6 p.m. Monday–Friday
10 a.m. to 2 p.m. Saturday (PST)

P.O. BOX 1588
6934 Canby St. Suite #109-110
Reseda, CA 91335

We welcome International Orders and Corporate Accounts.

Telex 292415COMPU UR/Fax 818-705-4885

1 818 705-1895 US 1 800 231-6603 CA 1 800 328-4473 US

CIRCLE 205 ON READER SERVICE CARD

Silicon Specialties

1-800-634-0402

MIT SYSTEMS

$1095

MIT PC/286 TURBO
12 MHz, 1024 K Memory,
200 Watt Power Supply,
1.2 MEG Floppy Drive,
Enhanced AT-Style Keyboard

FREE AIR EXPRESS SHIPPING
You Pay the Ground
We Pay the Air

Hardware

MODEMS

Hayes All Modules	Call
Incomm Modems New	Call
Prometheus	
1200B	75
2400 B **New**	119
Other Models	Call
US Robotics	
Password 1200	149
Courier 2400	299

MONITORS

Amdek Monitors	Call
NEC	
Multisync II	$ 599
Multisync Plus	889
Other Models	Call
Mitsubishi Diamond Scan	509
Princeton Graphics Monitors	Call
Princeton Ultrasync	485
Sony Multiscan	535
Thompson Ultrascan	519
Samsung	Call
Mitsubishi Diamond Scan	509
Zenith 1490	609

PRINTERS

Alps All models	Call
AST Turbo Laser	$4310
C.ITOH	Call
Citizen Printers	
120D	145
180D	159
MSP 40	319
MSP 45	465
MSP 50	399
MSP 55	530
Other Models	Call
Diconix 150	309
300	480
Epson Printers	Call
Hewlett-Packard	
Laser Jet Series II	1775
Desk Jet	779

DISK DRIVES

Bernoulli Box 10 Meg	$ 909
Beta EXT	1019
Beta INT	909
Magnum Tape Back up	Call
Seagate 20 MG w WD Controller	275
251-1	469
Toshiba 3 5 720K	95
3 5 1 4 MB	115
Teac Floppy FS5 BR	79
AT 1 2 MEG	89

KEYBOARDS

Keytronics KB5151	$ 119
KB5153	149

PRINTERS

NEC Silentwriter	Call
P2200	329
P-6	418
P-7	815
Okidata Printers	Call
Panasonic	
1080I Model II	165
1091I Model II	199
1524	525
1595	429
Lazer P4450	1635
Other Models	Call
Star Micronics	Call
Toshiba	
321 SL	485
341 SL	655
351 SX	979
Page Lazer	2415

COMPUTERS

AST Model 80	$ 1715
Model 120	2405
Model 340	4345
Model 390	5839
NEC	
Multispeed EL II	1495
Powermate	Call
Toshiba T-1000	785
T 1100 Supertwist	1370
T-3120	3058
T-3200	3789
T-5100	4899
Other Models	Call

BOARDS

AST	
Hot Shot	$ 345
Six Pack Plus	115
3 G	225
XFormer	545
Other Models	Call
ATI EGA Wonder	175
VIP VGA	265
Hercules	
Color Card	145
Graphics Card Plus	175
Incolor New	209
Intel	
Inboard 386 PC	719
Inboard 386 AT w cable	979
4020	375
80287-6 New	175
80287-20	705
Orchid	
Designer EGA	265
Paradise	
Autoswitch 350	130
VGA **New**	239
VGA Professional New	355
Video-7	
VGA	259
Vega Deluxe	180

HARD CARDS

Plus 20 MEG	$ 525
Plus 40 MEG	659

Software

SPREADSHEETS

Cambridge Analyst	$ 79
HAL	89
Lotus 1-2-3 Ver 2 01	295
MS Excell	285
Multiplan 3 0 (Microsoft)	113
Quattro	116
PFS Pro Plan	52
Supercalc 4	269
Twin Classic	32
VP Planner Plus	82

ACCOUNTING

Accpac	Call
DAC Easy	$ 52
One Write Plus 2 0	117
Time Slips III	109

LANGUAGES

C Compiler (Microsoft)	$ 259
Fortran Compiler (Microsoft)	259
Macro Assembler (Microsoft)	86
Ryan McFarlan Fortran	379
Ryan McFarlan Cobol	609
Pascal Compiler (Microsoft)	175
Quick Basic 4 0	57
Turbo C	58
Turbo Pascal 4 0	58

DESKTOP PUBLISHING

Newsmaster II	$ 39
Pagemaker	442
PFS First Publisher	52
Ventura Publishing	489

GRAPHICS

Charmaster	$199
Diagram Master	185
Generic CAD w Dot Plot 3 0	72
Harvard Graphics 2 1	239
In-A-Vision	259
Microsoft Chart 3 0	229
New Room	30
News Room Professional	42
Printmaster Plus	29
PrintShop	32
Signmaster	132
Turbo Graphix Tool Box	58
Windows Draw!! w clip art	159

MICE

PC Mouse w paint (Buss or Ser)	85
PC Mouse w Autosketch (Buss or Ser)	99
Logimouse	65
Logimouse w paint	87
Microsoft Buss Mouse 1 0	82
Microsoft Serial Mouse 1 0	92
Optimouse w Dr Halo III	82

MONEY MANAGEMENT

Tobias Managing Your Money 4 0	$114
Dollars & Sense w Forcast	92

DATA BASE MANAGEMENT

Clipper	$ 368
dBase III Plus	374
DB-XL Diamond	105
Eureka	88
Fox Base Plus 2 0	185
Genifer	188
Nutshell	75
Paradox 2 0	415
PFS Professional File	119
Q & A	185
Quickcode Plus	129
QuickReport	138
Revelation	459
R Base For DOS	425
Reflex	78
VP Expert	56
VP Info	56

PROJECT MANAGEMENT

Harvard Total Project Manager II	$309
Microsoft Project 4 0	287
Timeline 2 0	259

INTEGRATIVE SOFTWARE

Ability Plus	$ 137
Enable 2 0	352
Framework II	309
MS Works	113
PFS 1st Choice	76
Smart Software System	Best Price
Symphony	435

WORD PROCESSORS

Microsoft Word 4 0	$185
Multimate Advantage II	249
PFS Professional Write	102
Volkswriter 3	132
Volkswriter Deluxe Plus	57
Webster New World Writer	53
Webster Spell Checker	32
Webster Thesaurus	37
Word Perfect	Call
Word Perfect Executive	Call
Word Perfect Library	Call
Wordstar Pro Pack 5 0	Call
Wordstar 2000 Plus Personal	205

ACCESSORIES

Copy II Option Deluxe	$ 99
Masterpiece	79
Masterpiece Plus	92
Masterpiece Remote	107
MousePad by Mousetrac	8
Summasketch 12 x 12 Plus	359

TRAINING

Flight Simulator	$ 29
MS Learning DOS	29
PC Logo	79
Turbo Tutor II	42
Typing Instructor	27
Typing Tutor IV	27

VISA MasterCard

- **No Charge for VISA and Mastercard**
- **We Do Not Charge Your Card Until Your Order is Shipped**
- You Pay the Ground Shipping $6 00
- We Pay the Air Difference
- Free Air applies ONLY to orders up to 10 lbs & Over $50
- All product carriers a manufacturer's warrantee All Guarantees rebates trial period privileges & promotional programs are handled by the manufacturer only
- No APO / FPO or international orders please
- **Call before submitting P O s Ask for National Accounts**
- Personal and Company Checks Will Delay Shipping 3 weeks
- Prices Terms & Availability Subject to Change Without Notice
- Add 3% for COD Orders
- **We Do Not Guarantee Machine Compatibility**

Mailing Address
[illegible] Avenue Phoenix Arizona 85027
To Place an Order 800-634-0402
Write up an Order (602) 944-2552
Office Hours Mon-Fri 7 am-6 pm
Saturday 9 am-1 pm
Order Processing Hours (602) 944-1013

CIRCLE 123 ON READER SERVICE CARD

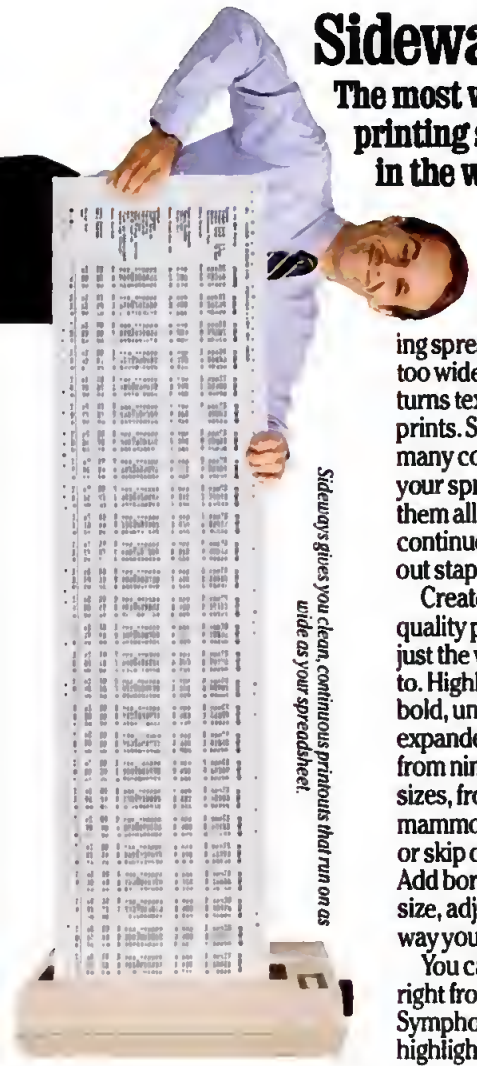
Perfect running

It's no contest. Funk's 1-2-3® performance software helps improve your 1-2-3 productivity better than any other software you could possibly track down.

That's because each one is in perfect step with 1-2-3. With menus and commands like 1-2-3 itself. And with

Sideways.

The most widely used printing software in the world.



Sideways gives you clean, continuous printouts that run on as wide as your spreadsheet.

Sideways® has always been the one software to turn to for printing spreadsheets that are too wide for your printer. It turns text on its side as it prints. So no matter how many columns you put in your spreadsheet, you get them all back out in one continuous printout. Without staples, glue or tape.

Create presentation-quality printouts that look just the way you want them to. Highlight ranges with bold, underlined, and expanded type. Choose from nine different type sizes, from minuscule to mammoth. Print through or skip over perforations. Add borders, change page size, adjust margins any way you like.

You can run Sideways right from your 1-2-3 or Symphony menu. Just highlight a range and print.

Plus, Sideways is the right way to print with all your other software, too. Including databases, word processors, project planners, even other spreadsheets. And it prints with all popular dot-matrix printers, as well as the LaserJet Plus/Series II.

"Sideways is such a fundamental improvement in spreadsheet printing that I find it hard to imagine using 1-2-3 without it."
PC MAGAZINE

InWord.

Full-function word processing that runs inside 1-2-3.

If you need to create letters, memos, or reports that include data from your spreadsheet, you need InWord.™

InWord is just a keystroke away from 1-2-3. So you don't have to jump through hoops to put spreadsheet data into a document.

Create live links to data in your spreadsheet. When you change the spreadsheet, the changes appear in the document automatically.

And Inword's powerful formatting features rival the best stand-alone word processors. InWord fully supports the capabilities of your printer, whether it's a 9-pin dot-matrix or an HP LaserJet. You can mix pitch and typefaces freely, and even print in proportional type with full micro-spaced justification for the ultimate in print quality.

"Of all the 1-2-3 word processing add-ins, InWord is the cleanest, fastest, easiest to use." PC MAGAZINE

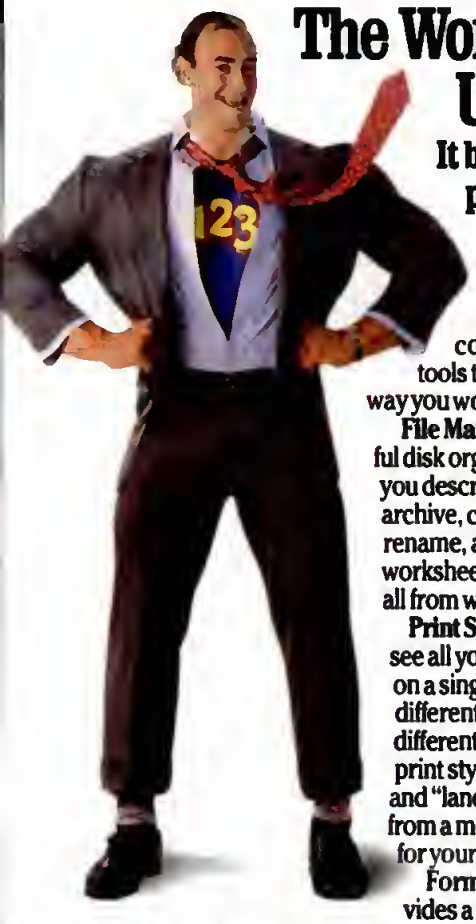
With InWord, automatic mailmerge is as easy as selecting a range from your 1-2-3 spreadsheet database.

InWord gives you instant spreadsheet integration, plus powerful formatting and typestyle controls

partners for 1-2-3.

powerful functions and features that take up right where 1-2-3 leaves off.

So don't wait. Dash out to your favorite software store and ask for them by name. Or order directly from Funk Software.



The Worksheet Utilities.

It brings out the power user in anyone.

The Worksheet Utilities™ is a collection of powerful tools that will change the way you work with 1-2-3.

File Manager is a powerful disk organizer that lets you describe, catalog, archive, copy, move, erase, rename, and compress worksheets and other files, all from within 1-2-3.

Print Settings lets you see all your print settings on a single screen, create different print settings for different jobs, and select print styles like "17 pitch" and "landscape mode" from a menu customized for your printer.

Formula Editor provides a powerful environment for entering, editing, and debugging formulas, with point/shoot menus for @functions, prompting for arguments, and an on-line @function reference manual.

Search and Replace lets you hunt through your spreadsheet for labels, values, @functions, and cell references – and optionally replace them.

AutoSave creates periodic back-ups of work-in-progress, to guard against power failures and editing mistakes.

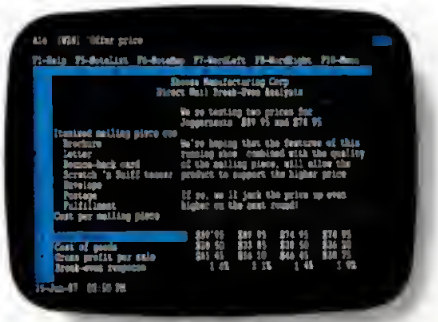
"Indispensable... a stunning set of utilities... the Formula Editor is simply beyond belief." PC WEEK

Sideways is a registered trademark and The Worksheet Utilities, InWord and Noteworthy are trademarks of Funk Software, Inc.
© 1988 Funk Software, Inc.

Noteworthy.

The software that remembers. So you don't have to.

Noteworthy™ is the professional cell-annotation and documentation software that lets you tell the story behind the numbers, formulas and macros in your spreadsheet.



With Noteworthy, neither you nor others who use your spreadsheets need ever forget the true meaning of a cell.

Want to remember why you put what you put in a cell? Just press the hot-key and up pops a blank note. Then type away using Noteworthy's powerful built-in editor. Make as many notes as you need, each one up to 8000 characters long. Copy text from a note to a spreadsheet. From a spreadsheet to a note. Or from one note to another.

It even reminds you where you put your notes. As you move through your spreadsheet, an indicator lights up whenever you land on a cell containing a note.

"The simplest, most effective, and the most customizable way to attach notes to spreadsheets."
PC MAGAZINE

FUNK SOFTWARE

Sideways $69.95
Works with all versions of 1-2-3 or Symphony

The Worksheet Utilities $99.95
Requires 1-2-3 Release 2

InWord $99.95
Requires 1-2-3 Release 2

Noteworthy $79.95
Requires 1-2-3 Release 2 or Symphony

To order call:

1-800-822-3865 ext. 115

Funk Software, 222 Third Street, Cambridge, MA 02142

CIRCLE 323 ON READER SERVICE CARD

Above & beyond the call.

Software

Word Processing/ Desktop Publishing

Byline	$ 199
Microsoft Word	$ 229
Multimate Adventege-II	$ 279
Lotus Manuscript	$ 339
Office Writer/Speller	$ 249
Pagemaker 3.0	$ 569
PFS: Prot Write	$ 119
Publisher's Type Foundry	$ 259
Ventura Publisher	$ 519
Word Perfect 5.0	$ 195
Wordstar Pro 5.0	$ 199
Wordstar 2000 + 3.0	$ 229
Xywrite III +	$ 229

Database Systems

Clipper	$ 389
DBase III Plus	$ 389
Date Perfect	$ 269
DBase IV	$Cell
Foxbase +	$ 199
Paredox 2	$ 429
PFS: Prof File	$ 149
Q&A	$ 209
R Base for DOS	$ 479
RapidFile	$ 199
Reflex	$ 99
Omnis Quartz	$ 469

Spreadsheets/ Integrated Packages

Javelin +	$ 169
Lotus 1-2-3	$ 309
Lotus Hel	$ 49
Microsoft Excell	$ 319
Microsoft Works	$ 139
Plan Perfect	$ 179
Quattro	$ 129
Smart System	$ 449
SuperCalc 4	$ 289
Symphony	$ 495

Communications

Carbon Copy +	$ 119
Crosstalk XVI	$ 99
Crosstalk MK 4	$ 125
Relay Gold	$ 149
Smerterm (Persoft)	$Cell
Smertcom III	$ 149

Statistics

SPSS/PC +	$ 699
Statgraphics 2.6	$ 479
Systat 4.0/ W/Graphics	$ 499 $649

Desktop Environments

MS Windows	$ 69
Sidekick Plus	$ 129

Graphics

Boeing Greph	$ 219
Chartmaster	$ 219
Design CAD	$ 159
Diegreph	$ 259
Diegrem Mester	$ 199
Freelance Plus	$ 329
Herverd Graphics	$ 279
MS Chert	$ 269
PC Paintbrush Plus	$ 89
Picture Perfect	$ 199
Presentetion Pak	$ 349
Publishers Peintbrush	$ 159
Signmaster	$ 139

Project Management

Herverd Totel Project Manager II	$ 369
Microsoft Project 4.0	$ 329
Superproject Plus	$ 289
Timeline 3.0	$ 349

Languages/Utilities

Festback +	$ 99
Lattice C	$ 229
Norton Advanced	$ 79
Microsoft C	$ 299
Mece Utilities	$ 65
MS Fortran 4.0	$ 299
Quick Besic/Quick C	$ 69
Turbo Basic/Turbo C	$ 65
Turbo Pascal	$ 65

Accounting

AccPec BPI	$ 279
Great Plains	$ 499
Peachtree Comp II	$ 159

Hardware*

Computers

AST Premium 286	$ Call
Samsung	$ Cell
Sharp PC4502-A	$1175
Toshiba 3100/20 +	$ Cell

Multifunction Boards

AST Adventege Premium (512K)	$ 309
AST 6 Pek Plus (64K)	$ 129
AST Premium (256K)	$ 219
AST Rempege 286	$ 419
Everex RAM 4000	$ 299
Inboerd 386AT	$1050
Inboard 386 PC	$ 750
Intel AboveBoerd	$ Cell

Display Boards

ATI EGA Wonder +	$ 199
Hercules Network Card Plus W/Tops	$ 349
Peradise VGA Plus	$ 259

Modems

Hayes 1200/1200B	$ 299
Heyes 2400/2400B	$ 449
US Robotics 1200B	$ 109
US Robotics 2400B	$ 189
Ventel 2400/2400B	$ 389
Ventel 2400/2-PS2	$ 299

Networking

Arcnet Board	$ 149
Novell Adv. Netware 286	$1499
Novell ELS	$ 399

Emulation Boards

AST 5251-11 +	$ 629
Irma/2 PCA/MCA	$ 725
Quadram Mainlink IV W/ Software	$ 399

Monitors

Amdek 210A	$ 99
NEC MultiSync II	$ 649
Princeton HX-12 +	$ 439
Princeton MAX-12E	$ 149
Samsung Color	$ 229

Printers/Plotters

Epson FX-286E	$ 499
Epson LQ1050	$ 779
HP 7475A	$1499
HP Leserjet II	$1750
LQ-500	$ Call
NEC 3550	$ 789
NEC P2200	$ 369
Okideta 320	$ 375
Okidata 321	$ 519
Okidata 393	$1050
Okidete 293E	$ 675
Panasonic	$ Call
The Complete Hand Scenner	$ 169
Toshibe P321SL	$ 549
Toshiba P341SL	$ 749
Toshiba P351M2	$ 999

Mass Storage/Backup

Bernoulli II Duel	$1799
Irwin Tepe Drives	$ Call
Mountein 40MB Int Tape	$ 389
Plus HardCard 20MB	$ 519
Plus HerdCard 40MB	$ 719
Seegete ST251-1	$ 529
Seegete ST 225 W/int	$ 289
Seagete ST238 W/int	$ 319
Sysgen Bridge	$ 299

Input Devices

Keytronics KB 101	$ 109
Logitech Hi-res Mouse	$ 99
Logitech M8 Mouse W/ Paintshow	$ 69
Microsoft Mouse	$ 109
PC Mouse w/Peint	$ 99

Accessories

Curtis Ruby	$ 59
DateShield S-100	$ 69
Logicel Connection	$ 329
Mesterpiece Plus	$ 125
256K Ram Set	$Cell
8087 Math Chip	$ 119
80287-8/80287-10	$289/$339
80387-16/80387-20	$529/$775

***CALL FOR SHIPPING COST**

ATTENTION CORPORATE BUYERS!!

Join over 1000 major corporations and institutions who have selected **SOFTLINE** as their primary vendor. Here's why:

- **Wide Selection**—We carry over 1000 "corporate" titles. We will assist you to source those difficult requests.
- **Low Price** Our motto has always been "Sample our Sarvica. Price shall never be an issue."
- **Faat Delivery** For those last minute rush orders, we offer convenient overnight delivery.
- **P.O.'a, of Coursell** We accept purchase orders from qualified organizations. Ask aboul our customized purchasing programs for volume buyers.

ATTENTION INTERNATIONAL BUYERS!!

We process export orders to thousands of companies worldwide. Convenient TELEX and FAX facilities available.

Contact **Fay Chayne**, Intl Sales Managar.

Celebrating 5 Years of Excellence

1-800-221-1260

Customer Service Hours: 9 AM—5 PM, Mon.—Fri.

In New York State call (718) 438-6057

FREE SHIPPING

on all orders over $1,000.00, credit card orders and prepaid orders.

MasterCard VISA

Softline

1333 60th Street
Brooklyn, NY 11230-0010
TELEX 627-30170 or 910-240-3918
FAX. (718) 438-2315

Our Policy: • All returns require prior authorization • 20% Restocking fee on returns • POs accepted from qualified organizations • Visa or Mastercharge—add 3% • COD, Cash M.O. or bank check only—add $5.00 per order • Prepaid personal or company check—allow two weeks to clear • Shipping via UPS surface—add $5.00 per item, UPS Blue—add $10.00 per item • Prices subject to change, call for latest prices.

■ STEPHEN MANES

EXTENSION COURSE: FILENAMES FOR THE FUTURE

33RDAND.LEX? POWER.USR? WHATSTHE.DIF? Some claim the DOS file system is woefully inadequate and hopelessly out of date. But old habits die hard . . .

Half the PC users on the planet whine and moan about how you can call Macintosh files anything you want from "Nasty Letter About Morton Downey" to "My Soothing Windham Hill Collection," while the IBM world is stuck with names like GEEK4.YUK and WINSTON3.AAH. But Joe Astute, my source who wears those "Get OSsified" T-shirts, tells me help is on the way. It's a fairly low priority until Presentation Manager rolls out the door with fewer bugs than a recumbent elephant, but OS/2 will one day include a real file system on top of the toy one we've got now.

But hey, after years of doing things one way, do you toss cherished customs out the window? Do you fiddle with the strike zone? Do you change the balk rule? What's wrong with tradition, anyway? DOS filename rules are part of our computer heritage, a precious legacy from CP/M. Must we throw these lovable babies out with the dirty DOS bathwater?

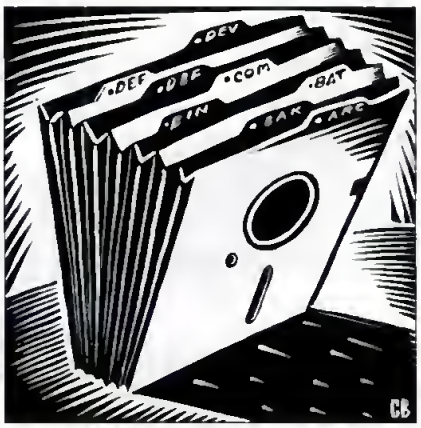
I think not. Fortunately for those of us who care about our roots, a certain computer company has given our cause a boost. By copyrighting the use of descriptive filenames anyone can understand, it has precluded their use by anyone unwilling to pay a license fee of a dollar a filename (before quantity discounts)—thereby throwing a monkey wrench into the OS/2 scheme. Fortunately, an even bigger computer company has proposed an entirely new way of looking at eight-dot-three filenames—one that will work fine with OS/2 and yet maintain compatibility with the DOS we know and love.

FOLLOW THE DOT I refer, of course, to the Strongly Typed International Filename Format 8.3 (STIFF 8.3), which was developed years ago but never implemented. Fully SAA-, SNA-, LU 6.2-, OS/2-, DOS-, and cable-compatible, STIFF 8.3 lays down precise rules for filename extensions, thereby letting all users instantly and precisely determine what kind of data is in a file merely by perusing the three characters that follow the dot.

Earlier versions of the STIFF protocol were hampered by being out of touch with DOS reality. The key to the widespread acceptance of the newly revised STIFF 8.3 is that it recognizes and locks in forever such accepted DOS filename extension conventions as these:

.ARC File compressed to avoid your wasting 40 days and 40 nights transmitting or using it.

.BAK A protective file destined for deletion before you really need it.



.BAT Telltale hidden file cleverly created by baseball game to let the boss know you were playing when you should have been working.

.BIN File created by wine list program; bad years are deleted automatically by system.

.COM A "Common" program file that can actually fit into 64K of memory and is therefore offered at a bargain price.

.DBF "Debased" file; contains only corrupted information.

.DEF A system warning that the disk it appears on is defective.

.DEV File containing satanic cult messages that can hold your hard disk in thrall.

.DOC "Eliza" program to diagnose and cure associated software when it behaves erratically.

.DYN *Lotus 1-2-3* template for creating personal ratings of fine restaurants.

.EXE A fancy "executive" program virtually unlimited in size and therefore commanding hundreds of dollars more than the "common" one that does the same thing.

.HEX Another one of those devil-worshiping viruses likely to screw up your hard disk.

.HLP A file begging to be put out of its misery.

.INC File containing sensitive encrypted corporate data.

.INI Filetype used exclusively with programs that employ "spaghetti code"; for example, CAPELL.INI, TORTELL.INI, LINGU.INI.

.INX Configuration file specifying what color pens a plotter should use.

Illustration: Cathe Bleck

■ STEPHEN MANES

.KEY The password that opens the gates to all your other files. (Under STIFF 8.3, this must be kept in the root directory to obviate user forgetfulness.)

.LBR "Labor" program file that can clash severely with .EXE files.

.LIB File converting offensively chauvinistic "sexist" language to "non-sexist" terminology.

.LOG File that produces an essential part of the Frogger game display.

.MAC A special form of .INI files.

.ME A file containing absolutely essential last-minute instructions no one bothers to read.

.MSG A file that can produce terrible headaches for many users; delete if you're sensitive.

.OBJ "Objection" file; includes a vast variety of complaints about the bugs in a particular program.

.OVR Self-modified file signifying that its useful life is "over" and therefore ripe for deletion.

.PRN File containing highly charged sexual imagery; keep away from children.

.RPT "Repeat" file that contains a boring version of information duplicated elsewhere.

.SCR "Screw-up" file reporting program problems.

.STY File included with application software by certain disgruntled programmers to secretly indicate that the accompanying program is a real pig.

.SYN File that works insidiously in tandem with .DEV files to trash your hard disk.

.SYS File requiring knowledge of secret password to display covert feminist message.

.WK1 Spreadsheet template that works just once.

.WKS Spreadsheet template that works some of the time.

.007 File created from lost clusters; reconstructing it requires the espionage talents of James Bond.

.$$$ File indicating a programmer's engagement in wishful thinking.

I wish I had space to list all the wonderful new filetypes designated under STIFF 8.3. If you can think of it, there's an extension for it. Early-childhood programs? Use .GOO. Expense account data? An obvious .LIE. There's even .DIM—expressly for articles daring to poke fun at a certain large computer company.

And there's no doubt in my mind: STIFF 8.3 will instantly become the all-encompassing industry standard. Ignore all those pundits who keep predicting great things for the nine-character-dot-four-character or even wilder formats. Believe me: such things are about as likely as lights in Wrigley Field.

The United States Senate Used askSam To Manage Every Word Of The Iran-Contra Hearings.

When The United States Senate Select Committee compiled the volumes of testimony and evidence during the Iran-Contra hearings, they used askSam to manage every word.

The system stored, searched for and quickly retrieved even the most obscure detail, text or numerical, with unparalleled speed and ease of use—without the crippling restrictions of the average database. It's this unique, versatile "free-form" design that makes askSam's Version 4 the perfect system to manage all of *your* information.

From sales leads to research notes, financial lists to videotape collections, askSam keeps all your information at your fingertips.

Easy Entry, Swift Retrieval.

askSam includes the most advanced data entry and retreival features available, like our full-screen text editor for easy addition of new records with or without formal definition of fields. Or you can use our ASCII-import facility for importing word processing or database files.

The Information Manager.

askSam's full-featured system makes it versatile enough to handle any amount of information for any particular need.

Power-users will appreciate innovative numerical capabilities, report generators (up to 160 columns wide) and field manipulation as

You Can Use askSam To Manage Your Information.

well as askSam's command language, security features and automatic phone dialer.

If you're not a power user (yet) askSam offers extensive context sensitive, on-line help screens whenever you need them— wherever you are.

askSam's Hypertext Facility.

With askSam's powerful hypertext facility, you can easily create menus of askSam files, programs and much more.

Money-Back Guarantee.

We'll give you 60 days to see just what askSam can do—and how it can manage your valuable information—for just $295.

PC MAGAZINE
1986
1987
Awarded PC Magazine's Editor's Choice two years in a row

See Your Dealer Or Call

(800)-3-ASKSAM

In FL call (904) 584-6590

askSam™
from askSam Systems

P.O. Box 1428, Perry, Florida 32347

Seaside Software, Inc is now askSam Systems askSam requires 256K on any IBM® PC, XT, AT, or compatibles and IBM® PS/2
Copyright 1988, askSam Systems askSam is a trademark of askSam Systems.

CIRCLE 471 ON READER SERVICE CARD

Who Says FoxBASE+ is Better than dBASE®?

The Experts!

The Best Just Got Better—Now Shipping New FoxBASE+ Version 2.10!

Nicholas Petreley, *InfoWorld Review Board:*
"FoxBASE+ has outdone itself. Once again, FoxBASE+ earns an "excellent" in performance, with kudos for responding to user suggestions. For sheer productivity, there is no other choice." *InfoWorld* "Editor's Choice" for 1987 and 1988!

P.L. Olympia, *Founder & President, National Dbase Users Group / Government Computer News:*
"FoxBASE+ is a supercharged dBASE, with all the features Ashton-Tate forgot. If you're into serious dBASE development and have not tried FoxBASE+, you are living in the dark ages and wasting your company's money."

George F. Goley IV, *Cont. Editor, Data Based Advisor:*
"The product is fast, very compatible, fast, easy to use, fast, relatively inexpensive, and very fast. In every test, FoxBASE+ outperformed the other products. And people who answer the phone at Fox know what they are talking about."

David Irwin, *Former President/CEO, Data Based Advisor:*
"From the dBASE compatibility standpoint, FoxBASE+ is flawless. From the speed standpoint, FoxBASE+ is unbelievable. From the "lazy factor" standpoint, FoxBASE+ is perfect."

Glenn Hart, *Contributing Editor, PC Magazine:*
"Initial tests of FoxBASE+ were simply stunning. In many ways, FoxBASE+ gives you the best of both worlds: all the benefits of interactive development and debugging, plus the speed and code protection of a compiler."

Adam Green, *Contributing Editor, Data Based Advisor, dBASE Author:*
"For the PC, FoxBASE+ has consistently set the performance standard for dBASE compatible languages. For the Macintosh, FoxBASE+/Mac will set standards for innovation and leadership in a new dBASE implementation."

Don Crabb, *Contributing Editor, InfoWorld:*
"You can expect blazing speed on the Mac. FoxBASE+/Mac breezes past tests that have proven stumbling blocks for Macintosh databases in the past. FoxBASE+/Mac combines complete dBASE compatibility with a genuine Macintosh user interface."

This is what they said about Version 2.00 of FoxBASE+. Imagine what The Experts will say about New Version 2.10 with these added features: Menu-Driven Interface, Program Documentor, Screen Painter and Template-Based Application Generator . . . and Version 2.10 is even faster than 2.00!

Join The Experts. Get your copy of the New FoxBASE+ Version 2.10 today! Now available at your nearest, quality software retailer, or directly from us by calling (419) 874-0162 Ext. 760.

Because, when it comes to speed, compatibility and valne, nothing runs like the New FOX—Version 2.10!

Fox Software

Nothing Runs Like a Fox.

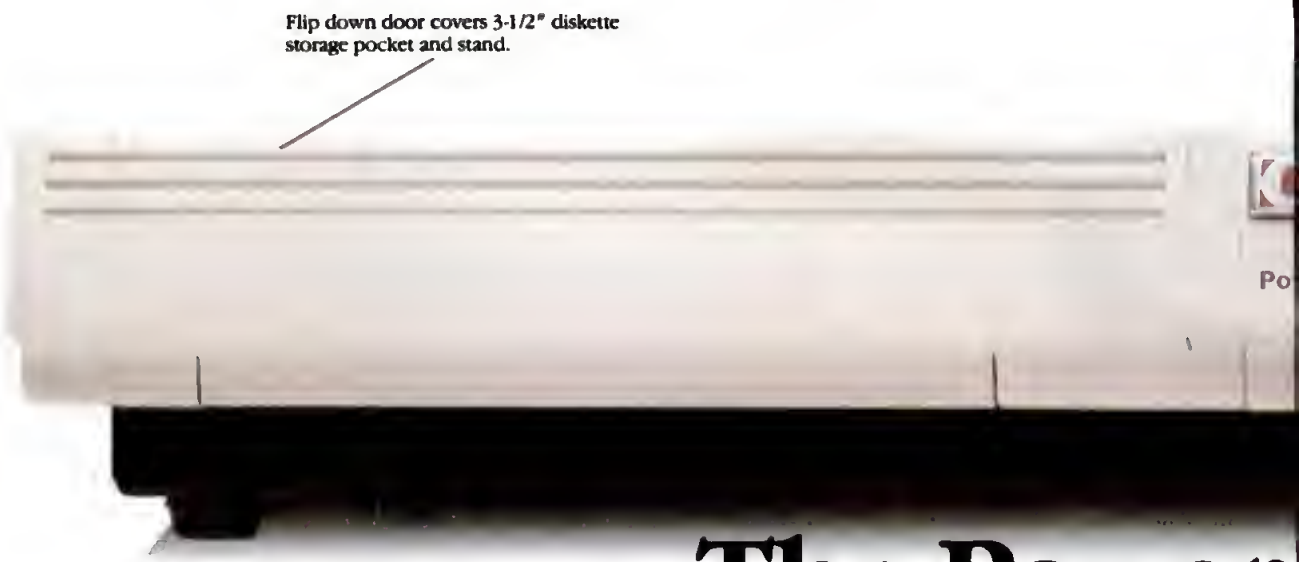
Fox Software
118 W. South Boundary
Perrysburg, OH 43551

(419) 874-0162 Ext. 760.
FAX: (419) 874-8678
TELEX: 6503040827 FOX

FoxBASE and FoxBASE+ are trademarks of Fox Software.
dBASE and dBASE III PLUS are trademarks of Ashton-Tate
Macintosh is a trademark of Apple Computers, Inc.

CIRCLE 112 ON READER SERVICE CARD

Introducing the in power



The Power

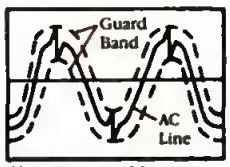
Advanced protection for today's computers.

Today's generation of personal computers are more powerful and can process greater amounts of information faster than ever before. Consequently, electrical surges can now destroy more expensive equipment and larger amounts of data. That's why we built Power Director III. The first of its kind specifically designed to protect today's computer systems. Like IBM PS/2 and Macintosh II computers.

The performance leader.

Since 1982, when we introduced the original Power Director, Computer Accessories Corporation has been the forerunner in power protection for microcomputers. Many years of surge suppression and design experience have led to the development of Power Director III.

Power Director III's unique "Sine Wave Tracking" technology closely monitors incoming power with a guard band that clamps surges and spikes. Instantaneously. Before they can damage your computer system.

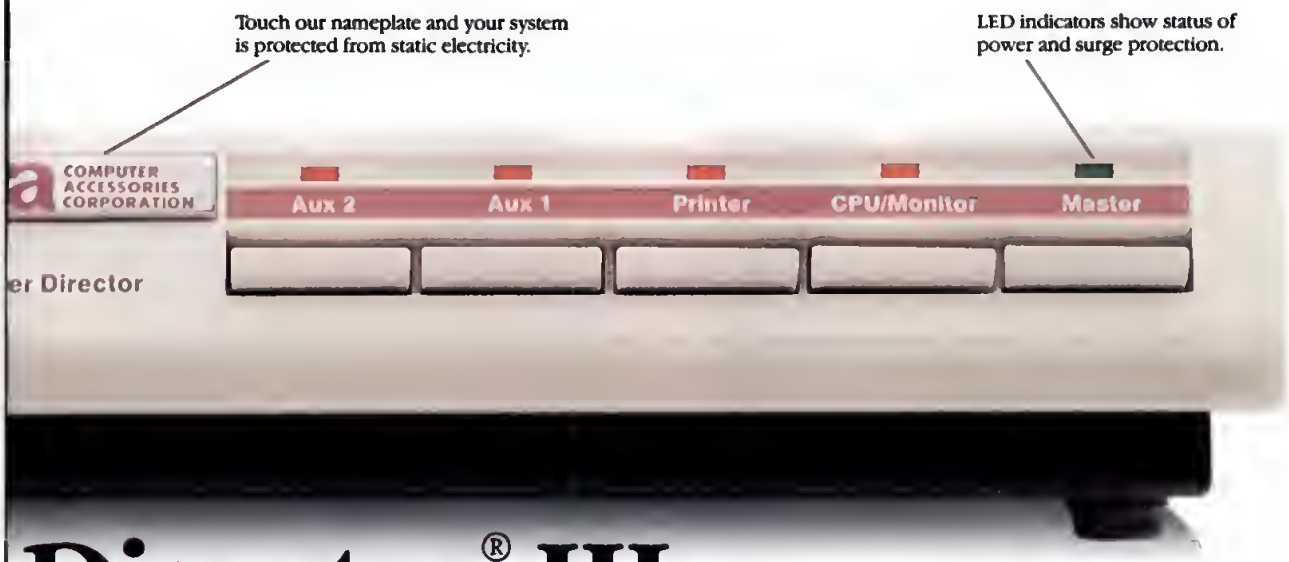


Sine-wave tracking stops surges instantly.

Power Director III also meets rigid UL and IEEE 587 Category A and B surge protection performance standards assuring that your system and data are safe from common electrical disturbances and line noise interference. And even static electricity. Power Director III includes these performance features:

- UL Listed
- IEEE Category A and B
- High performance noise filter
- Advanced surge suppression
- Static protection
- Sine wave tracking

next generation protection.

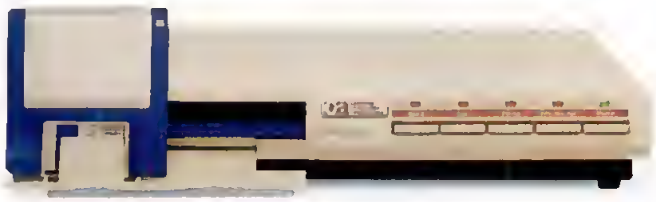


Director® III.

Built for your convenience.

Power Director III lets you switch on every peripheral and your computer with the push of a button. Saving you the hassle of fumbling for switches.

And Power Director III comes with a free built-in 3½" diskette storage pocket and diskette stand to keep your disks organized and at your fingertips.



Designed for future growth.

Power Director III's storage pocket can be converted easily into other productivity enhancing devices. Such as a data switch for economical peripheral sharing. Or a print buffer to enhance printing ease. And no other surge suppression and power control center affords you this expandability.

Protect your investment.

Pick up the latest generation surge suppression and power control center today. Power Director III. Before a surge can put your system out of business. For the dealer nearest you, call 1 (800) 582-2580 or in California, 1 (800) 582-0852. Ask for extension 501.

COMPUTER ACCESSORIES CORPORATION

We support the system

6610 Nancy Ridge Drive
San Diego, CA 92121

IBM PS/2 is a registered trademark of International Business Machines Corporation
Macintosh II is a licensed trademark of Apple Computer, Inc

CIRCLE 516 ON READER SERVICE CARD

FAX #: (602) 246-7805
Order Line—1-800-421-3135 (Ext. 100)
Order Status and
Technical Support
602-246-2222

WAREHOUSE DATA PRODUCTS

Servicing our PC buyers with low pricing and technical experience since 1979.

— HARDWARE —

NOW AVAILABLE

MICROSOFT MACH 20	$329
MICROSOFT WINDOWS 386	$119

FREE SOFTWARE!

Purchase over $100 and receive one of these disks absolutely FREE! Purchases over $250 get two free disks, over $400 get three, or get all four disks when your purchase is over $500! **1) MIXED BAG. 2) PC-WRITE. FONT-SET. 4) ABC-LIST.**

Accessories

Brooklyn Bridge Universal	$72
Copy II PC Deluxe	101
Curtis Ruby	59
Mach III Joystick	36
Masterpiece	85
Masterpiece Plus	95
Steadiwatt	65
150 Watt Power Supply	69

Boards

AST Advantage Premium	$319
AST Fastboard 386	Low Price
AST Rampage 286	379
AST Sixpac	129
AST Xformer	Low Price
Everex—2MB Above PC/X7	79
Everex—3MB Above AT	89
Generic IO XT/AT	65
Hercules Graphics Plus	179
Inboard 386	Low Price
Intel Above 286	319
Microsoft Mach 20	329
Orchid Tiny Turbo	289

Computers

AZ 386	$2595
NEC 386	2910
Wyse 386	2900

AZ Turbo XT

IBM Compatible Computer,
135 watt power supply,
1 brand name floppy disk,
PC keyboard, 640K Ram,
8 expansion slots,
8088-2 processor **$529**

AZ Turbo AT

512K, 6 & 10 MHZ, keyboard,
200 watt power supply, one
1.2 teac drive, Phoenix Bios **$975**

Laptop Portables Computers

NEC Multispeed XL-Z	$1649
NEC Powermate Portable 20 MB	$2999

AST 286 or 386 Premium Computer

512K, expandable to 2 MB on the system board, RT enhanced style keyboard, parallel, serial and clock, 1.2 MB floppy disk drive, 7 expansion slots, DOS 3.3 & Basic
Available Now **Best Prices**

AZ 10

150 watt power supply,
dual 360K drive, 10 MHZ
mother board, 640K,
keyboard **$549**

EGA Boards

AST VGA	$275
ATI VIP	259
ATI EGA Wonder	175
NEC 1024	855
Orchid Designer VGA	259
Paradise Auto 480	155
Paradise VGA+	269
Quad EGA Plus	165
Zenith VGA	259

EGA Monitors

AMDEK 722	$455
Casper	410
Mitsubishi Diamond Scan	499
NEC Multisync II	619
Samsung	359

Floppy Drives

Teac 5¼" 360K	$99
Toshiba 3½" 1.44 MB	129
Other Famous Brands	Low Price

Hard Cards

Plus Hardcard 20 MB	$529
Plus Hardcard 40 MB	659

Hard Drives

Miniscribe 20 MB	$299
Seagate 20 MB w/Cont	265
Seagate 30 MB w/Cont	295
Seagate ST 125 w/Cont	329
Seagate ST 138 w/Cont	399
Seagate ST 251-40-NS	399

Keyboards

Keytronics RT101	$85
Keytronics 5151	119
Keytronics 5153	245
NTC Enhanced 101	89

Incredible Values

Genius Mouse	$59
Monochrome Board w/printer port (similar to Hercules Graphics)	$69
Data Copy Microfax Board	$800
Amdek CD Laser Drive	$640
Desktop Publisher Graphics	$99

Mice

Logitech	$68
Microsoft Bus w/Paintbrush	97
Microsoft Serial	97
Optimouse w/Dr Halo	89
Optimouse w/DPG	155

Modems

AZ 300/1200	$75
Everex 300/1200	89
Everex 2400 Int.	229
Everex 2400 Ext.	250
Hayes 1200	299
Hayes 2400	439
Novation Parrot 1200	89
U.S. Robotics 2400	335
U.S. Robotics 1200 Pass	180

Monitors

AMDEK 410 Amber	$145
AMDEK 410 Green	149
AMDEK 410 White	157
Magnavox RGB	255
NEC GS Amber	190
Princeton HX 12E	460
Princeton Max 12	138
Samsung TTL Amber w/tilt	79
Samsung Color w/tilt	249

Printers

CITIZEN	
MSP 15E	Low Price
MSP 40	Low Price
MSP 45	$415
120 D	Low Price
180 D	Low Price
Premiere 35	Low Price
EPSON—Call on all models	
LQ500	330
LQ850	528
NEC	
P5XLP	815
P960XL	1005
P2200	335
P6-P7 Color Kits	125
OKIDATA—Call on all models	
OKI390	590
OKI391	689
PANASONIC	
080-I/M2	189
1091-I/M2	204
1092-I	329
1524	604
1592	419
1595	449
3131	279
3151	497
STAR MICRONICS	
ND15	419
NX1000	179
NX1000 Color	238
NX15	306
TOSHIBA	
321 SL	510
341 SL	Low Price
351 Model SX	910

Laser Printers

Canon Laser	Low Price
NEC 850+	$1480
NEC 860+	2050
NEC 890	3300
Laser Imaga 2000	Low Price
Okidata Laser 6	1324
AST Turbo PS	3199

Co-Processor

80287 (Intel)	$165
80287-8 (Intel)	259
80287-10	309
80387-16	510
8087-2 (Intel)	159
8087 (Intel)	125

- Shipping on most software is $5.00.
- AZ orders add 8.7% sales tax.
- Personal/company check allow 14 days to clear.
- We accept Purchase Orders from authorized institutions for 3.5% more than cash price. (Please call in first.)

- All returns are subject to our approval.
- There will be a 20% restock fee on all returns.
- Sorry, no refunds on open software, due to copyright laws.

1-800-421-3135 (Ext. 100)

We Stock All Available Products

SAVE 60% On Our Everyday Prices

We Cater to the First Time Buyer
Call our friendly technical service
(602) 246-2222

THIS MONTH'S SPECIAL
MICROSOFT PC Excel
SPECIAL $295

— SOFTWARE —

Accounting

Dac Easy Accounting	$54
Dac Easy Light	39
Dac Easy Payroll	39
Dollars & Sense	94
In House Accounting	112
Managing Your Money 3.0	117
Peachtree Business Accounting	149

Communication Programs

Brooklyn Bridge Universal	$72
Carbon Copy Plus	108
Crosstalk XVI	89
Crosstalk MK4	110
PC Anywhere	79
Smartcom II	79
Transporter	140

Data Base Managers

Clipper	$375
Condor 3	325
DataPerfect	266
D Base III Plus	375
DB-XL	80
Fox Base Plus	169
Genifer	189
Knowledgeman 2	285
Paradox 2.0 Premium	435
PFS: Professional File	139
Powerbase	169
Q&A	188
Quicksilver	295
Revelation	464
R Base For DOS	425
Reflex	81
Relate & Report	112
VP Info	65

Desktop Publishing

Pagemaker	$477
PagePerfect	279
PFS: First Publisher	54
Ventura Publisher	493

Diskettes

Bernoulli cart. 10 MB	$69
Bernoulli cart. 20 MB	79
Maxell 5¼" DS/HD	24
Maxell 5¼" DS/DD	20
3M 5¼" DS/HD	20
3M 5¼" DS/DD	15
3M 600A Data Tapes	29

DOS

IBM 3.3	$102
DOS	Low Price

Educational

Microsoft Learning DOS	$28
Turbo Tutor II	25
Typing Tutor IV	30

Entertainment

Chuck Yeager Flight Simltr.	$35
F15-Strike Eagle	24
Hacker II	30
Kings Quest	32
Jet	39
Microsoft Flight Simulator	31
Scenery Disk 1-7	17
Silent Service	30
Star Flight	40
Sub Battle	30

Graphics

Boeing Graphics	$200
Chartmaster	189
Design Cad 2	148
Diagram Master	199
Easy Cad	109
Energraphics 2.01	294
Generic Cad	49
In-A-Vision	270
Microsoft Chart 3.0	243
Newsroom	31
Newsroom Professional	42
Printmaster	29
Printshop	33
Printshop Companion	29
Signmaster	132

Integrated

Ability	$56
Ability Plus	145
Enable	352
Framework II	370
Microsoft Works	120
Smart Software	429
Symphony	465

Languages

Lattice C Compiler	$220
Microsoft C Compiler Ver. 5	275
Microsoft Fortran 4.1	Low Price
Microsoft Macro Assembler	92

Languages

Microsoft Pascal	$185
Microsoft Quick Basic	59
Microsoft Quick C	59
Ryan McFarlan Fortran	342
Ryan McFarlan Cobol	549
Turbo Basic	56
Turbo C	59
Turbo Pascal	56
Turbo Prolog	56
Turbo Prolog Toolbox	56

Multi-User Software

Microsoft Word	$195
Fox Base	299
Word Perfect	310
Word Perfect Modules	75

Project Manager

Microsoft Project	$305
Super Project Expert	Low Price
Timeline 2.0	265
Total Havard Manager 2	355

Spreadsheets

Hal	$104
Lotus 1-2-3	309
Microsoft PC Excel	295
Perfect Plan	189
Quattro	117
Spreadsheet Auditor	82
Surpass	329
VP Planner	95
VP Planner Plus	69

Utilities

Copy II PC	$19
Copywrite	39
Cubit	39
D.A.V.E.	56
Deskview 2.0	72
Direct Access	49
Duet	49
Eureka	95
Fastback Plus	87
Formtools	56
Gopher	33
Graph In the Box Release 2	55
Hot	89
H TEST	69
Lotus Metro	89
Mace	56
Microsoft Windows 2.03	59
Microsoft Windows 386	119
Norton Advanced	75

Utilities

Norton Commander	$37
Norton Utilities	48
Numerical Methods	56
PC Tools Deluxe	37
Prokey 4.0	70
Q DOS II	49
Rightwriter	75
Sidekick Plus	115
Sideways	39
S.O.S	44
Sqz	55
Super Key	56
Turbo Lighting	55
XTree	35

Word Processing

Easy Extra	$54
Lightening	75
Microsoft Word 4.0	195
Multimate Advantage II	259
Varsity	49
Volkswriter 3	139
Webster Spellcheck	33
Webster Thesaurus	33
Will Writer	29
Word Perfect 5.0	209
Word Perfect Executive	109
Word Perfect Library	55
Wordstar ProPack	233
Wordstar 2000+	229
Word Wizard	39

We Feature Microsoft Software for the Macintosh

Call For Items Not Listed.

WAREHOUSE DATA PRODUCTS
2701 W. Glendale Ave.
Phoenix, AZ 85051
1-800-421-3135
(Ext. 100)

- All Prices are subject to change
- Sorry, no COD orders.
- Minimum phone order $50.00
- We do not guarantee compatibility

Phone Hours: Monday thru Friday 7 am-9 pm.
Saturday 9 am-5 pm MST.

No Charge for MasterCard or Visa

MasterCard VISA

CIRCLE 171 ON READER SERVICE CARD

The Cure for MacEnvy.

For years PC users have been conditioned to think of their computers in certain terms. Dependable. Versatile. Dull. To get superior graphics, some claimed that you need a different type of computer altogether. They said *their* computer was everything the PC wasn't. Easy to use. Graphically exciting. Fun. PC owners were, well, *green* with MacEnvy.

Enter Micrografx.

With the Micrografx family of applications, you don't have to trade in your PC. Micrografx software turns your computer into a complete graphics studio for desktop design, publishing, and presentations.

Allow us to illustrate.

Micrografx Designer lets you go from rough concept to finished art, giving you the power to bring your ideas to life. Micrografx Graph Plus™ is packed with easy-to-use charting features for the business user. Micrografx Draw™ gives you control and simplicity in a basic drawing program. And Micrografx software supports hundreds of printers like HP's LaserJet™ and PaintJet.™ All PostScript™ devices, too.

And there's more. Micrografx ClipArt™ libraries contain volumes of professionally designed symbols and illustrations. Micrografx Convert™ translates between the PIC and DXF file formats.

So take a bite out of the argument that PCs can't do superior graphics, and get the cure for MacEnvy. Ask your dealer for a demonstration or call us for more information.

Micrografx. The picture of success.

MICROGRAFX

1820 N. Greenville Ave. • Richardson, TX 75081
214/234-1769 • 800/272-3729
Telex 650309-3890 • FAX 2142342410

NEARING PERFECTION

VGA BOARDS ENTER the MAINSTREAM

Even if your budget precludes the purchase of a new PS/2, you needn't be stuck with last year's video technology. With any one of these low-cost VGA boards, you'll get the most dazzling colors and highest resolution yet available.

Until a few months ago, getting true VGA graphics meant biting not just a budgetary bullet but an entire artillery shell and buying a Micro Channel PS/2. The only alternative, trying to upgrade a PC, XT, or AT to the new video standard, was chancy at best. The first crop of VGA video adapters for the PC family failed to guarantee completely interchangeable functionality with the new IBM standard because those boards embodied only BIOS compatibility. That is, they recognized the same machine language instructions that were used by the PS/2 VGA BIOS, but their circuitry was quite unlike that of the IBM product. While they promised the same resolution and color capabilities as the IBM VGA system, when programs dipped below the BIOS to take direct control of the hardware, the early adapters could miss their cues.

The nine new video adapters from Everex, Intelligent Data Systems, Orchid Technology, Paradise Systems, Sigma Designs, Tatung, Taxan, Tecmar, and Video Seven examined here show the next step in bringing the VGA standard to PCs, XTs, and ATs: register compatibility. Not only do these video boards know and understand all of the IBM BIOS commands, but they can also be controlled at the hardware level through their registers. (A register is a special kind of silicon storage that allows video chips, microprocessors, and the like to remember numbers and settings during their calculations.) Register compatibility means that your software can bypass the BIOS to take direct control of certain hardware facilities of the VGA board. The advantage of register compatibility is that it lets your program skip the BIOS routines and the overhead they impose, thus bringing improved performance—snaz-

zier colors, new video modes with more characters on the screen, faster text and graphic displays, smooth dot-by-dot scrolling—to software that takes advantage of them.

More than that, many of these video adapters promise better-than-VGA performance. Some offer 1,000-line-plus resolution; many multiply the color selection available at higher resolutions. They bring the best video yet to your PC's screen. Of course, you'll need special software drivers (which may support a limited array of programs) and a MultiSync-style monitor to take advantage of many of these super-resolution modes.

Besides the nine boards reviewed here, two other products claim hardware compatibility with the VGA standard: Compaq Computer Corp.'s Video Graphics Controller Board ($599), and IBM's PS/2 Display Adapter ($595). Both were reviewed in "VGA Compatibles: Gaining on the New Standard" in the February 16, 1988, issue of *PC Magazine*, in which the Compaq board, with its 16-bit bus interface and fastest memory access speed, was chosen as Editor's Choice.

TWIN TRENDS Take a close look at these nine boards, and you'll see two trends emerging in VGA design. Some engineers are attempting to craft exact clones of the IBM VGA products, alike in all details and capabilities, and limiting their use solely to VGA and VGA-compatible MultiSync-style monitors. Others are aiming at the universal, endowing their products with the ability to plug into nearly any standard display.

The former adapters presume you'll never want to use anything less than a 31.5-kHz fixed-frequency VGA monitor. The latter boards let you get VGA compatibility today without forcing you to buy a VGA display; these adapters will work with whatever monitor you have. Later, as your budget allows, you can upgrade your display without tossing out your video board.

The supported standards include the one used by the IBM Monochrome Display Adapter (MDA), the Color/Graphics Adapter (CGA), the Hercules Graphics Adapter, the Modified CGA capabilities of the PS/2 Models 25 and 30 (MCGA), and the Enhanced Graphics Adapter (EGA). None of these video adapters support composite input monitors: those using RCA-style connectors and having limited bandwidth. There are distinct differences, however, among the downward compatibilities of the VGA boards that support many standards. Some are only BIOS-compatible with earlier video standards, while others are register-level-compatible with them.

The unexpected downside to these backward-compatible boards is that, with the exception of the Sigma Designs VGA/H, they lack one essential ingredient of true VGA hardware compatibility: precise plug compatibility with the IBM VGA Video Feature Connector, the promised gateway to as-yet unnamed, unannounced, and unspecified add-on IBM accessories.

Nothing about these backward-compatible boards precludes the use of an IBM-style VGA Video Feature Connector. The omission is probably partly coincidental and partly because many engineers chose to offer EGA-style expansion for compatibility with existing (rather than ethereal) enhancements.

While the IBM-clone VGA boards generally give you just one connector—a DB-15 that matches the jack on the back of the PS/2—the backward-compatible VGA boards give you two. Like the other boards, they include a DB-15 that supplies analog signals to match VGA-style monitors and a DB-9 with digital signals to fit the previous standards. When you have your choice, for instance, with a MultiSync-style display that supports both analog and digital inputs, choose the former. IBM digital interfaces restrict your color choices to 64, while analog signals can put a virtually unlimited spectrum on the screen.

BETTER THAN EVER Each of these VGA adapters represents a substantial engineering achievement, notwithstanding its falling short of perfect VGA compatibility. All will bring more colors and sharper images to your PC, better than any previous video standard. Although you might still find minor compatibility problems, most of these boards should perform flawlessly with nearly all available VGA software. And with any one of them you won't have to put your PC out to pasture to see real VGA greens.

EVEREX SYSTEMS INC.

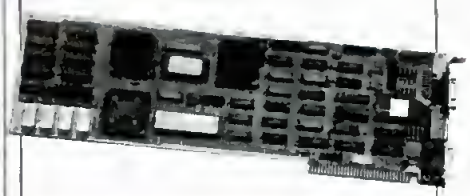
Everex EVGA

With its EVGA board, Everex pushes the maximum resolution you can expect from your MultiSync-style monitor up to an almost unbelievably sharp 1,280 by 600 pixels in four colors, without sacrificing VGA hardware compatibility. In addition, the $399 EVGA delivers backward compatibility with all standard video modes, including Hercules Graphics, and all standard monitor types. The EVGA will even drive two monitors simultaneously, albeit with the same image.

Fitting all those features takes a lot of logic. Mixed among the 13.3-inch EVGA card's DIP logic chips are four major VLSI chips, all Everex proprietary products, an Inmos DAC, and 256K of 100-nanosecond RAM.

TWO MONITORS Both analog/digital DB-9 and analog DB-15 connectors are available, and Everex okays simultaneous

PC MAGAZINE FACT FILE



Everex EVGA
Everex Systems Inc.
48431 Milmont Dr.
Fremont, CA 94538
(800) 821-0806
(800) 821-0807 (in Calif.)
List Price: $399
Requires: PC, XT, AT, or compatible, or PS/2 Model 30
In Short: A full-length register-compatible VGA board with good backward compatibility for analog or digital monitors and a maximum resolution ability of 1,280 by 600 in four colors.

CIRCLE 699 ON READER SERVICE CARD

VGA Boards: Summary of Features

(Products listed in ascending price order)

	Tecmar VGA Tecmar Inc. $395	Ultra-Gralix VGA Model 580 Card Taxan USA Corp. $395	Everex EVGA Everex Systems Inc. $399	Paradise VGA Plus Card Paradise Systems Inc. $399	Sigma VGA/H Sigma Designs Inc. $399	Tatung VGA Platinum Card Tatung Co. of America Inc. $429	Designer VGA Orchid Technology $445	Intelligent VGA Board Intelligent Data Systems Inc. $445	VEGA VGA Video Seven Inc. $499
VIDEO STANDARDS SUPPORTED									
MDA	●	●	●	●	●	●	●	●	●
HGC	●	●	●	●	●	●	●	●	●
CGA	●	●	●	●	●	●	●	●	●
EGA	●	●	●	●	●	●	●	●	●
VGA COMPATIBILITY									
BIOS	●	●	●	●	●	●	●	●	●
Register	●	●	●	●	●	●	●	●	●
CONNECTORS									
9-pin	●	○	●	○	●	●	●	●	●
15-pin	●	●	●	●	●	●	●	●	●
OUTPUT									
Digital	●	○	●	○	●	●	●	●	●
Analog	●	●	●	●	●	●	●	●	●
MAXIMUM RESOLUTION									
Graphics (pixels)	800 × 600	800 × 600	1,280 × 600	800 × 800	640 × 480	800 × 560	1,024 × 768	800 × 560	800 × 600
Text (columns × rows)	132 × 44	132 × 43	132 × 44	132 × 44	80 × 30	132 × 44	132 × 44	132 × 44	132 × 43
COLORS									
Max. no. of on-screen colors	256	256	256	256	256	256	256	256	256
Total no. of colors in palette	262,144	262,144	262,144	262,144	262,144	262,144	262,144	262,144	262,144

●—Yes ○—No

use of both. You can plug in two different types of monitors—one into each connector (with some limitations)—and the EVGA board will produce the optimum image for each. Everex notes, however, that on-screen images may be dimmer due to the double termination (loading) of the EVGA's outputs.

The only thing lacking from the EVGA hardware is a VGA-style Video Feature Connector. In its stead, Everex has installed a 20-pin header with the same pinout (but not the same form factor) as that of the Micro Channel architecture video bus extension.

An array of jumpers and an eight-bank DIP switch, accessible through a retaining bracket cutout, are used to set up the EVGA. One bank of jumpers changes the DB-9 connector from digital to analog outputs. Other jumpers alter the base address and interrupt used by the board to avoid conflicts with other system enhancements. The DIP switches select the boot-up mode and type of monitor being used with the board. Color or monochrome VGA-style monitors plugged into the DB-15 connector automatically override these settings and set the jack to the output mode the monitor requires.

The EVGA has a limited automatic mode-switching ability. It can sense which display mode the software requires and attempt to match its function in its circuitry. However, Everex notes that sometimes this process is not entirely effective—for instance, when switching from Hercules to EGA modes. Consequently, Everex recommends using a special utility supplied with the board, EVGAMODE, for altering the operating mode of the board when moving between programs that ostensibly require different video adapters. The EVGA will, however, emulate Hercules-style graphics on otherwise incompatible monitors.

ENHANCED EGA MODES Besides the VGA and underlying standard modes, the EVGA also has several "enhanced EGA" modes, including three 94-column text modes (with 25, 29, or 51 rows), three 100-column text modes (with 37, 43, or 75 rows), and ten 132-column text modes (with 25 or 44 rows and various character matrices). Extended graphics modes include three using 256 simultaneous colors (512 by 480, 640 by 350, and 640 by 400 pixels), two 16-color modes (752 by 410 or 800 by 600 pixels), and two super-high-resolution four-color modes (1,280 by 350 or 1,280 by 600 pixels).

Using these advanced modes requires a MultiSync-style monitor and may require special driver software. Everex supplies drivers for *AutoCAD* and *Lotus 1-2-3* (Re-

VGA Add-in Board Architecture

VGA-compatible display adapters are designed to let you update the graphics capabilities of your existing PC, XT, or AT, allowing your system to display up to 256 colors from a palette of 262,144. The architecture of these boards, like that of the Sigma VGA/H shown here, supports register-level compatibility with the VGA standard. Many of these 8-bit boards feature both DB-9 and DB-15 connectors and also support a proprietary video mode that lets them deliver resolution that goes beyond VGA's 640 by 480 in 16 colors. Some, like the Sigma VGA/H, sport the VGA Video Feature Connector. With the exception of the full-length Everex EVGA, all of the boards evaluated here are half-length.

The Sigma VGA/H

100-nanosecond DRAM chip

The 256K of socketed 100-nanosecond DRAM is used to display text and images and speed up screen refresh time.

VLSI video chip

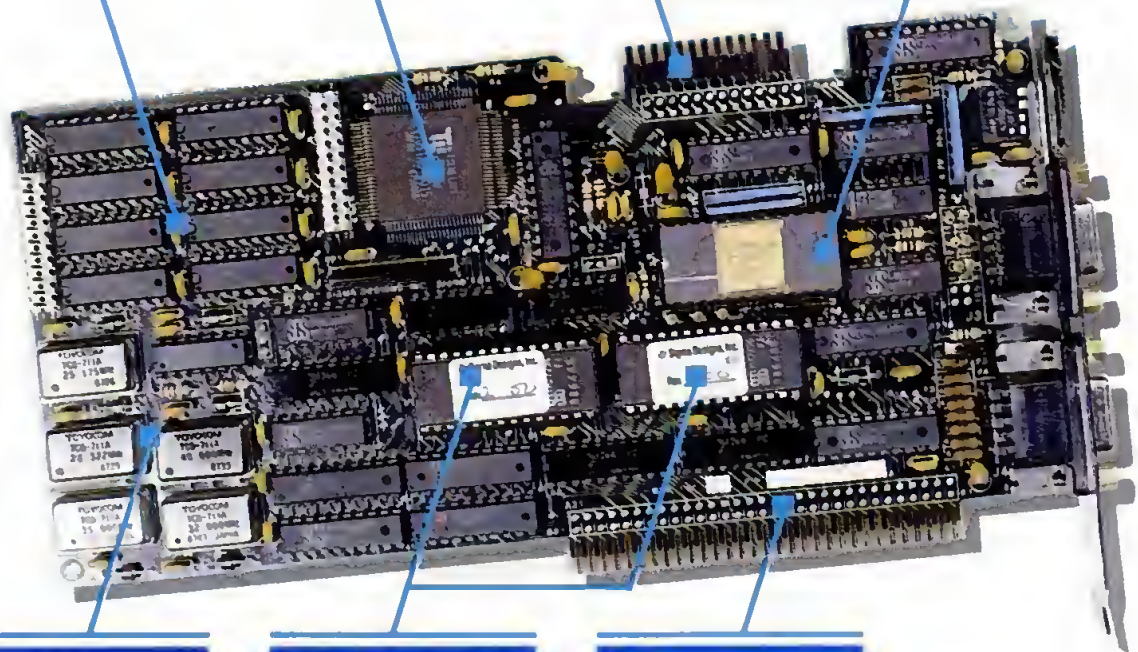
The VGA chip set, in this case from Tseng Labs, is a large VLSI chip that implements video circuitry control of the system's graphics controller.

VGA Video Feature Connector

The VGA Video Feature Connector, which is analogous to the feature connector found on EGA and EGA-compatible boards, is a port that allows for future enhancements to the display adapter board.

Inmos DAC

The Inmos Digital-to-Analog Converter (DAC) chip lets the board share digital and analog signals.



Oscillator chips

Five oscillator chips control the different clock frequencies that the board uses to handle each different video mode.

VGA BIOS chips

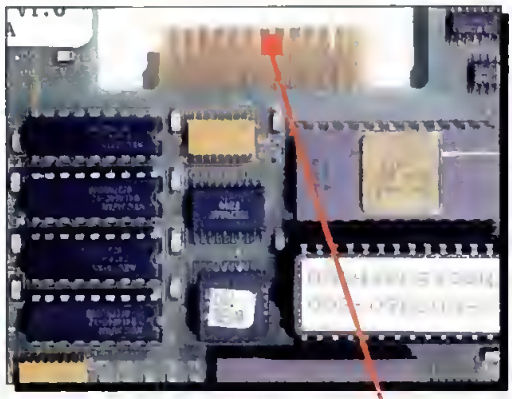
The VGA BIOS chips support the functions of the VGA registers.

8-bit bus connector

The 8-bit bus connector fits into both the 8-bit and 16-bit slots on the IBM PC, XT, and AT computers and compatibles.

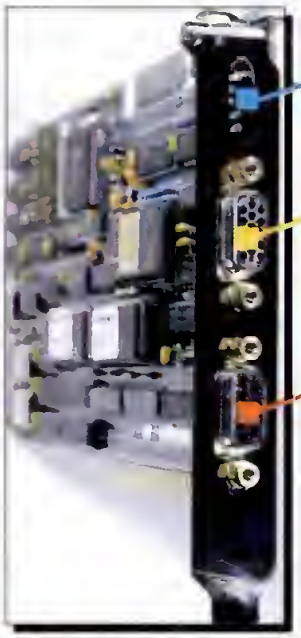
Paradise's connector

The Paradise VGA Plus Card, on which the Taxan Ultra-Grafix VGA Model 580 Card is modeled, offers only a single DB-15 connector at the rear of the board. However, Paradise does supply a 15-pin-to-9-pin connector, which allows the board to support Hercules, MDA, and CGA modes and to work with many styles of monitors.



Taxan's VGA Video Feature Connector

Taxan uses e finger-type connector for additional features similar to those offered on the Sigma board. These types of connectors do differ, though, as you can see with the Video Feeture Connector available on the VEGA board.



Sigma's four-position DIP switch

The four-position DIP switch allows you to change the board's video mode.

DB-15

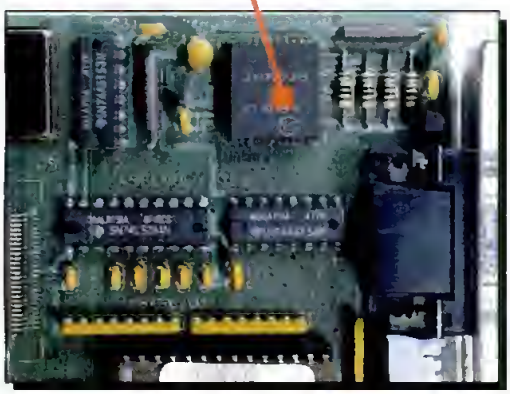
The DB-15 connector, which matches the jack on the PS/2, supplies analog signals to match VGA-style monitors.

DB-9 connector

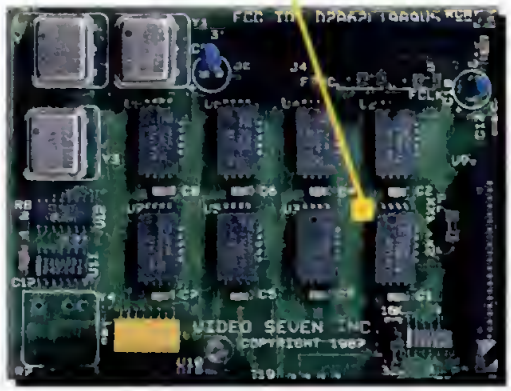
The DB-9 connector supplies digital signals to match previous video standards, including MDA, CGA, and EGA.

Tecmar's DAC from Brook Tree

Conspicuously absent from the Tecmar VGA is the standard Inmos DAC, which is used by IBM VGA and its clones. Instead, the Tecmar VGA uses a smaller DAC from Brook Tree.



The small footprint of the eight RAM chips (256K) on the Video Seven VEGA VGA shows an economy of design. Above the RAM chips is e female multipin feature connector.



lease 1A). In addition, a font-loading program, FONTLOAD, with 22 downloadable fonts is included.

The Everex EVGA passed all of the PC Labs VGA compatibility tests with the exception of direct writes in modes 7 and 15.

The strengths of the Everex EVGA are its very high compatibility and many enhanced EGA modes. Although it would benefit from a greater number of drivers and, perhaps, simplified setup, it nevertheless ranks as a good VGA alternative.

INTELLIGENT DATA SYSTEMS INC.

Intelligent VGA Board

Intelligent Data Systems calls its product the Intelligent VGA Board not just to echo the company name, but also to highlight one of the board's more-advanced features: it automatically adapts software images designed for one display to match whatever you have. Among those abilities, the $445 Intelligent VGA can put CGA graphics on a TTL monochrome display and EGA graphics on CGA displays. Beyond the standard 17 VGA modes, the Intelligent VGA can also generate 16-color graphics with resolutions up to a maximum of 800 by 560 pixels.

Seven inches long, the Intelligent VGA combines Chips and Technologies' VGA chip, an ATI Technologies VLSI circuit for its more-arcane any-graphics-on-any-display abilities, and an Inmos DAC. The board also includes 256K of 120-nanosecond RAM soldered to the board. Expansion is possible through the Intelligent VGA's EGA feature connector.

Physically, the Intelligent VGA bears more than a superficial resemblance to Tatung's Platinum Card, and it also mimics Tatung's compatibility with various standards. Although the Intelligent VGA is BIOS compatible with the IBM VGA standard, it is not 100-percent register-level-compatible. The Intelligent VGA also claims hardware compatibility with the EGA standard as well as BIOS compatibility with the MDA, CGA, and Hercules Graphics Cards. With a special adapter board, it will also drive the internal displays of Compaq portable computers.

The Intelligent VGA mates with both analog and digital displays through the female 9-pin and 15-pin D-shell connectors on its retaining bracket. In addition, an output for an RF modulator is also available as a header on the board itself.

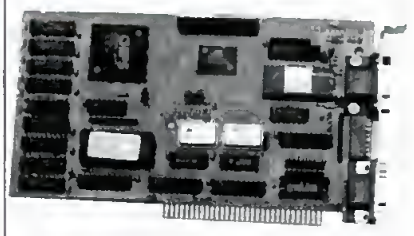
AUTOMATIC CONFIGURATION While the Intelligent VGA automatically configures itself for VGA-style displays, an eight-bank DIP switch that can be adjusted through a cutout in the bracket must be set to match MultiSync-style and digital monitors. Of the six sets of jumpers that line the edge of the Intelligent VGA card opposite its retaining bracket, only one, which sets the base address of the card to one of two values, is documented.

Besides supporting all current IBM video standards, the Intelligent VGA offers eight modes of its own. Text arrayed 132 columns by 25 rows is available on all but analog VGA monitors in 2 or 16 colors. Text arrayed 132 columns by 44 rows is available for all monitor types except VGA, CGA, and Portable Personal Computer internal displays, also in 2 or 16 colors. In addition, the Intelligent VGA features two 800- by 528-pixel modes (16-color graphics and 80-column by 66-row text in 16 colors), text 80 by 33 columns in 16 colors, and 800 by 560 graphics in 16 colors, all of which will require a MultiSync-style display.

To complement those modes, Intelligent Data Systems includes two disks of software. On them you'll find a control program for manually shifting video modes that also features a built-in screen saver to blank your monitor after a predetermined period of system inactivity. Drivers are supplied for the following applications: *AutoCAD*, *MicrosoftWindows*, *GEM*, *Ventura Publisher*, and *Lotus 1-2-3* (in 132-column text mode).

SLOW BIOS As might be expected, the Intelligent VGA performs nearly identically to the Tatung Platinum Card—both registered some of the slower speeds in the PC Labs performance and benchmark tests. The Intelligent VGA passed most of the PC Labs VGA compatibility tests. It failed the direct writes test in mode 13, and its video and CPU clocks were out of synch. Not far off the mark in terms of VGA compatibility, the Intelligent VGA can be used effectively in any system with any monitor, except in hardware-critical applications.

PC MAGAZINE FACT FILE



Intelligent VGA Board
Intelligent Data Systems Inc.
6319 E. Alondra Blvd.
Paramount, CA 90723
(800) 325-2455
(213) 633-5504
List Price: $445
Requires: PC, XT, AT, or compatible, or PS/2 Model 30.
In Short: Both register compatible with the VGA standard and backward compatible with previous standards, this 7-inch board can generate 16-color graphics with resolution up to 800 by 560 pixels. One of its strengths is automatically adapting software images designed for one display to any display you have.

CIRCLE 698 ON READER SERVICE CARD

ORCHID TECHNOLOGY

Designer VGA

Anything that you buy today, you take with the full knowledge that you have one foot in obsolescence and the other on a greased banana peel. Orchid Technology can help you avoid that backward-slipping feeling with its Designer VGA. Offering more than just register-level VGA compatibility, the $445 product is fully backward compatible with all monochrome and color video standards. Moreover, it sneaks beyond the VGA specification with up to 256 colors at 640 by 480 resolution and ultimate capabilities of up to 1,024 by 768 pixels in 16 colors on interlaced displays.

What the Designer VGA is not is strictly VGA-hardware compatible. The 6-inch card lacks a VGA-style Video Feature Connector—or any expansion connector

Get your work done before 1991.

The future of personal computing is clear. More powerful PCs. Easier to use PCs. With graphics and character-based programs working side by side. Talking to each other. Multitasking. Windowing. Menuing. Mousing. Getting your work done easier and faster.

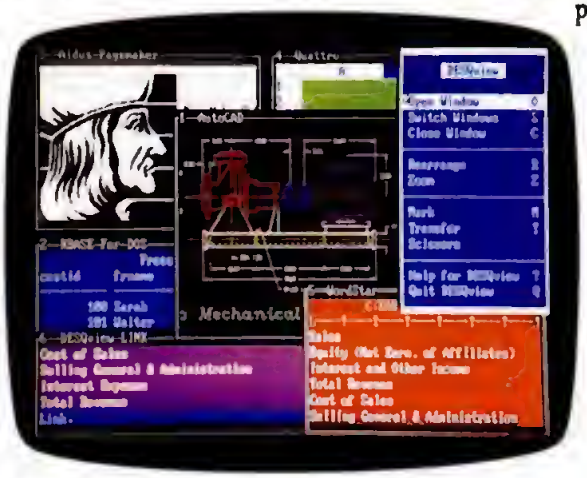
Have it all now.

DESQview™ is the operating environment that gives DOS the capabilities of OS/2.™ And it lets you, with your trusty 8088, 8086, 80286, or 80386 PC, leap to the productivity of the next generation. For not much money. And without throwing out your favorite software.

Add DESQview to your PC and it quickly finds your programs and lists them on menus. So you can just point to the program, using keyboard or mouse, to start it up. DESQview knows where that program lives. And what command loads it.

For those who have trouble remembering DOS commands, it adds menus to DOS. It even lets you sort your files and mark specific files to be copied, backed-up, or deleted—all without having to leave the program you're in.

Best of all, DESQview accomplishes all this with a substantial speed advantage over any alternative environment.



For programmers, DESQview's API, with its strengths in inter-task communications and multi-tasking, brings a quick and easy way to adapt to the future. With the API's mailboxes and shared programs, programmers are able to design programs running on DOS with capabilities like those of OS/2.

Multitask beyond 640K.

When you want to use several programs together, you don't have to leave your current program. Just open the next program. View your programs in windows or full screen. Open more programs than you have memory for. And multitask them. In 640K. Or if you own a special EMS 4.0 or EEMS memory board, or a 386 PC, DESQview lets you break through the DOS 640K barrier for multitasking. If you have other non-EMS memory expansion products like AST's Advantage or the IBM® Memory Expansion Option, we have a solution for you, too. The ALL CHARGECARD™ 'unifies' all your memory to provide up to 16 megabytes of continuous workspace. DESQview lets you use this memory to enhance your productivity. You can start 1-2-3 calculating and tell Paradox to print mailing labels while you're writing a report in Word Perfect, or laying out a newsletter in Ventura Publisher, or designing a building in AutoCAD.

DESQview even lets you transfer text, numbers, and fields of information between programs.

Fulfill the 386 promise.

For 80836 PC users, DESQview becomes a 386 control program when used in conjunction with Quarterdeck's Expanded Memory Manager (QEMM)-386—giving faster multitasking as well as virtual windowing support.

And when you use DESQview on an IBM PS/2™ Model 50 or 60 with QEMM-50/60 and the IBM Memory Expansion Option, DESQview gives you multitasking beyond 640K.

Experts are voting for DESQview. And over a million users, too.

If all of this sounds like promises you've been hearing for future systems, then you can understand why over a million users have chosen DESQview. And why *PC Magazine* gave DESQview its Editor's Choice Award for "The Best Alternative to OS/2," why readers of *InfoWorld* twice voted DESQview "Product of the Year" why, by popular vote at Comdex Fall for two years in a row, DESQview was voted "Best PC Environment" in *PC Tech Journal's* Systems Builder Contest.

PC MAGAZINE EDITORS' CHOICE NOV. 24, 1987

INFO WORLD 1986 AND 1987 PRODUCT OF THE YEAR

DESQview lets you have it all now.

DESQVIEW SYSTEM REQUIREMENTS:
IBM Personal Computer and 100% compatibles (with 8086, 8088, 80286, or 80386 processors) with monochrome or color display; IBM Personal System/2• Memory: 640K recommended, for DESQview itself 0-145K• Expanded Memory (Optional): expanded memory boards compatible with the Intel Aboveboard; enhanced expanded memory boards compatible with the AST RAMpage; EMS 4.0 expanded memory boards• Disk: two diskette drives or one diskette drive and a hard disk• Graphics Card (Optional): Hercules, IBM Color/Graphics (CGA), IBM Enhanced Graphics (EGA), IBM Personal System/2 Advanced Graphics (VGA)• Mouse (Optional): Mouse Systems, Microsoft and compatibles• Modem for Auto-Dialer (Optional): Hayes or compatible• Operating System: PC-DOS 2.0-3.3; MS-DOS 2.0-3.2• Software: Most PC-DOS and MS-DOS application programs; programs specific to Microsoft Windows 1.03-2.03, GEM 1.1-3.0, IBM TopView 1.1• Media: DESQview 2.0 is available on either 5-1/4" or 3-1/2" floppy diskette.

YES! I need increased productivity now!

Qty	Product	Format	Price Each	Totals
	DESQview 2.0	☐5-1/4 ☐3-1/2	$129.95	
	QEMM-386	☐5-1/4 ☐3-1/2	$59.95	
	QEMM-50/60	☐5-1/4 ☐3-1/2	$59.95	
	ALL CHARGECARD (Special for DESQview owners)		$200.00*	
		Shipping & Handling	$5 in USA / $10 outside USA	
		Calif Residents add 6.5%		
			Grand Total	

Name _____

Address _____

City _____ State ____ Zip ____

Payment Method ☐ Visa ☐ MasterCard Expiration ____/____

Account # ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

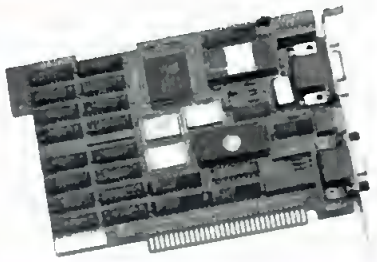
Quarterdeck

150 Pico Boulevard, Santa Monica, CA 90405
(213) 392-9851

*This ALL CHARGECARD is designed for the IBM PC AT and PS/2 50 and 60. If you have another type of 80286-based PC, there's a version for you, too. Please call 1-(800) 387-2744 for special ordering information. Offer expires August 31, 1988.
Trademarks are property of their respective holders: IBM, OS/2, PS/2, 1-2-3, Paradox, Word Perfect, Ventura Publisher, AutoCAD, Intel, Above Board, AST, RAMpage, Advantage, Hercules, Mouse Systems, Hayes, Microsoft, Windows, TopView.

CIRCLE 474 ON READER SERVICE CARD

PC MAGAZINE FACT FILE



Designer VGA
Orchid Technology
45365 Northport Loop W
Fremont, CA 94538
(800) 638-3322
(415) 683-0300
List Price: $445
Requires: PC, XT, AT, or compatible, or PS/2 Model 30.
In Short: A short board that combines VGA register compatibility and backward compatibility with previous video standards with 512K RAM, allowing resolutions up to 1,024 by 768 in 16 colors. Works with any monitor type.
CIRCLE 697 ON READER SERVICE CARD

at all. However, its 512K of on-board 100-nanosecond memory should take care of most future possibilities. Most of its capabilities derive from the Tseng Labs VLSI chip it's built around and its Inmos DAC.

ROOM TO GROW The Designer VGA excels in monitor compatibility. It gives you a solid growth path from IBM's original TTL Monochrome Display all the way up to the latest VGA and MultiSync-style monitors. Only archaeologists may be disappointed that it does not support standard CGA monitors.

The Designer VGA does require a minor setup to match it to your monitor before use. A jumper selects between monochrome and color modes, and a bank of four DIP switches selects the monitor standard. The switch (but not the jumper) can be adjusted through a cutout in the card-retaining bracket.

The Designer VGA adapts images for one standard, for instance Hercules, and readily displays them on another standard such as VGA. It will also display noncompatible VGA modes, for instance, putting monochrome VGA modes on color VGA displays.

Both DB-9 and DB-15 connectors are available for digital- and analog-interfaced monitors, respectively. With MultiSync-style monitors, resolutions beyond VGA include 800 by 600 in 16 or 256 colors, and the 1,024 by 768 interlaced display (which is not compatible with NEC MultiSync monitors). In addition, six 132-column modes are supported—three monochrome and three color—with character box matrices of 9 by 8, 9 by 14, and 9 by 13 in each.

DRIVERS AND UTILITIES Orchid supplies high-resolution drivers for *Lotus 1-2-3*, *Microsoft Windows* (including Version 2.0), and *AutoCAD*, as well as several utilities, some specialized (*AutoCAD* zooming) and some not (mode changing).

In testing, the Designer VGA proved almost unremarkable—and that's good. Its scores on the PC Labs performance and benchmark tests fall into the middle-to-slow category. The Designer VGA passed four of the eight PC Labs VGA compatibility tests.

Choose the Designer VGA if you want to maximize your flexibility in connecting different display types to your PC, XT, or AT, and in taking advantage of all possible video modes including very high resolution.

PARADISE SYSTEMS INC.

Paradise VGA Plus Card

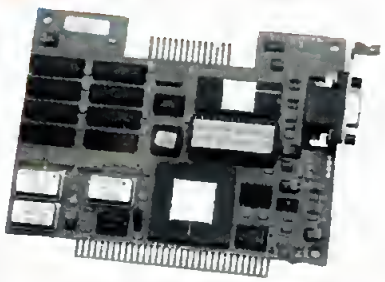
The "Plus" in the name of Paradise Systems' VGA Plus Card tells only part of the story. While the $399 adapter rates a true plus in its ability to go beyond the VGA standard to up to 800 by 600 resolution in 16 colors, it also dips below the standard, too. In so doing, it adds full backward software compatibility with all previous major video standards—MDA, Hercules Graphics, CGA, MCGA, and EGA—to PCs (except for the early 64K system board model), XTs, ATs, PS/2 Models 25 and 30, and compatibles.

All of those potentials are contained on a completely hardware-compatible 8-bit expansion card that's only 5¼ inches long. Most of the circuitry of the card is contained in one Paradise VLSI chip, supplemented by an Inmos DAC. The 256K of video memory on the card is rated at 120 nanoseconds.

ANALOG CONNECTOR At the top of the card is the requisite VGA Video Feature Connector. The card's retaining bracket is decorated solely with an analog DB-15 connector, which precludes the possibility of plugging in an incompatible display. The VGA Plus works with both color and monochrome monitors that follow the VGA standard, as well as MultiSync-style displays equipped with analog inputs.

Normally, no hardware setup is required when installing the VGA Plus. Per the VGA standard, it configures itself to accommodate monochrome or color displays and allows using only the display mode supported by that monitor type. However, Paradise also includes a utility program called VGAPLUS, which allows

PC MAGAZINE FACT FILE



Paradise VGA Plus Card
Paradise Systems Inc.
99 S. Hill Dr.
Brisbane, CA 94005
(415) 468-7300
List Price: $399
Requires: PC, XT, AT, or compatible, or PS/2 Model 25 or 30.
In Short: This 5¼-inch board offers a top resolution of 800 by 600 pixels in 16 colors; 256K of video memory; register compatibility with the VGA standard; backward compatibility with MDA, Hercules Graphics, CGA, MCGA, and EGA; and drivers for many popular software packages.
CIRCLE 698 ON READER SERVICE CARD

Business Forms That Mean Business

Isn't it frustrating? You need all kinds of forms to run your business. With a PC on your desk, why are you still doing forms by hand? Now with **FormWorx,**™ and **FormWorx with Fill & File,**™ you have two ways to streamline your forms processing. Save time. Save money. Get down to business.

FormWorx.™ Get the forms you want. Invoices, expense reports, tracking sheets, records, logs, and schedules. Whether it's a form you use a thousand times or a one-of-a-kind, you can make it with **FormWorx.** Start from scratch or modify one of the many forms we've already created for you.

Business forms that look business-like. Draw vertical and horizontal lines —single, double, and thick—with just a single keystroke. Lines print perfectly straight and solid on dot matrix and laser printers. Type and edit text. Large, wide, and condensed type sizes. Underline, boldface, center, justify, reformat, alter case, and more.

It's easy to change your mind. Stretch or shrink a form. Erase, copy, and move things around until every detail is just right. Sort and resort a list, search for a word, etc. There's even an "Undo" command for those times when the computer does what you say instead of what you mean.

The fastest and easiest forms generator on the market. Period. Intuitive pull-down menus and clear commands allow you to create your first form soon after opening the package. It's that simple.

NEW! FormWorx with Fill & File.™ Fill out forms perfectly.
All the features of **FormWorx** *plus* powerful **Fill & File** software that lets you easily fill out the same form again and again. Perfectly. Standard government and industry forms. Armed forces, real estate, insurance, health care, law, education,...

Form template shows on screen for easy fill-in. Simply tab from one blank to another and just type. Your typing stays in the blanks and the form is protected against accidental overwrites. Easily edit your entries and get letter-perfect printouts every time.

Lets you print only the data onto pre-printed forms. Perfect alignment every time. Or if you prefer, print the form and the data onto blank paper. Either way, you can use search conditions to batch print only those forms you need.

Minimizes retyping. "Lookup" lists help you type frequent entries automatically. "Ditto" repeats what you typed before. Date, time, and serial number "stamps" will save you precious time. And fixed data can be preserved in "Read-only" fields.

Stores data in a database file for later use. Just retrieve the information whenever you need it for that form...or any other form. Store up to 32,000 records in a single file. Easily locate and update specific records.

Reads and writes dBASE III Plus™ (.DBF) files directly so the data on your forms can be used to generate reports, summaries, mailing labels, form letters, etc. Easily create a form for loading information into your dBASE files. Or quickly make a form for viewing selected information in those files. ASCII and other file formats are also supported.

Fill & File even does the math!

Included free: FormWorx Programming Language. Automates forms processing in your office.

The critics are unanimous:

"FormWorx makes it easy to create forms. Inexpensive...easy to use." **The Wall Street Journal.**

"The user interface is first rate. Editing is especially easy. The documentation is well written, comprehensive, and easy to understand." **PC Magazine.**

And users agree:

*"A great product is only half the story. You folks at FormWorx also have that ingredient which is missing with so many products on the market today—**customer service.** You take care of your customers like few in the industry do today—and the customers keep coming back with their friends!"* **R.D.W., Lexington, S.C.**

1-800-992-0085

In Mass. 617-890-4499

FormWorx
CORPORATION

Reservoir Place, 1601 Trapelo Road, Waltham, MA 02154

Hardware requirements: Over 125 printers supported. Requires IBM PC, PS/2, or compatible with DOS 2.0 or higher. FormWorx—320 KB. FormWorx with Fill & File—512 KB. Works with or without a graphics board. Color is displayed on color systems. Available on 3.5" disks when specified. Not copy protected.

Prices and terms subject to change without notice. Trade-up rebate offer expires June 30, 1988. FormWorx and Fill & File are trademarks of FormWorx Corporation. dBase III Plus is a trademark of Ashton-Tate.

CIRCLE 174 ON READER SERVICE CARD

Special Offer! **FormWorx** is just **$95.*** **FormWorx with Fill & File** is just **$149.*** Each package includes dozens of ready-to-print forms, an easy-to-read manual with tutorials, and **FREE** telephone support.

Yes! Send me ☐ **FormWorx** ☐ **FormWorx with Fill & File**

☐ Please charge to my ☐ VISA ☐ MC ☐ AMEX

Card no. _____ Expires _____

Signature _____

Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Telephone (_____) _____

PCM7/88

☐ Enclosed is my check or money order

Make checks payable to **FormWorx Corp.** Shipping and Handling in US/Canada **FormWorx**—$4.75, **FormWorx with Fill & File**—$6.75. Air mail overseas **FormWorx**—$10. **FormWorx with Fill & File**—$18. In MA add 5% sales tax.

45-Day Money Back Guarantee! If for any reason you are not satisfied, call our customer service department to arrange for a prompt refund. Direct purchases only.

VGA Boards

PC Labs tested nine VGA boards that are IBM VGA BIOS-level as well as register-level compatible. Each was compared with the IBM PS/2 Display Adapter running in an 8-bit slot. The results for the Compaq Video Graphics Controller Board running in an 8-bit slot in an IBM PC AT were included for comparison's sake as were results for the same tests in a 16-bit slot and for the built-in VGA on an IBM PS/2 Model 60. The Windows Performance Tests and Video Benchmark Tests for VGA cards were run in a *Microsoft Windows*, Version 2.03, environment under DOS 3.2 on an 8-MHz IBM PC AT, an IBM PS/2 Model 60, and a Compaq Deskpro 386/20.

Overall, the IBM PS/2 Display Adapter board performed poorly in all the Windows Performance Tests. In two of the three Video Benchmark Tests, the IBM board came out somewhat slower than average; it was the slowest of the bunch in the Direct to Screen test. The Model 60 came out strong in the Video BIOS Routine Without Scrolling, owing in part to its 10-MHz speed. And while the Compaq V.G.C. Board's Direct to Screen test results show it's over twice as fast as any other VGA add-in board on the market, you need the appropriate device driver to take full advantage of this speed.

The Paradise VGA Plus Card fared well on most of the tests, with less-impressive results on only a few tests. Taxan's Ultra-Grafix VGA Model 580 Card also performed well throughout all tests. This, however, should be viewed as no coincidence: Taxan is using the identical board as Paradise Systems'.

Windows Performance Tests

Seven *Windows* call routines—LineTwo, Rectangle, Scrollwindow, FillRect, Ellipses, Bitblt, and Stretchblt—are used for the tests

The **60- by 20-Line Windows Test** measures the time it takes to perform the LineTwo function in a window that is 60 characters wide and 20 lines down. For the **Full-Screen Windows Test** the **Lines** test measures the time it takes to draw 100 random lines of various colors. The **Rectangles** test measures the time it takes to draw 100 rectangles of random size and color. The **Ellipses** test measures the time it takes to draw 100 ellipses of random size and color. The **Bitblt** test measures the time it takes to draw 100 rectangles of the same size. The **Stretchblt** test measures the time it takes to draw 100 rectangles of varying size but the same color. The **Scroll** test creates a rectangle that is 1/10 the height and 1/10 the width of the window in the upper-left-hand corner of the screen and measures the time it takes to scroll to the right pixel by pixel, down pixel by pixel, and diagonally to the upper left pixel by pixel. The **Fill** test measures the time it takes to fill the window 512 times with a color. The results for the Windows Performance Tests are expressed in milliseconds per single operation because of the varying size of different screens

Video Benchmark Tests

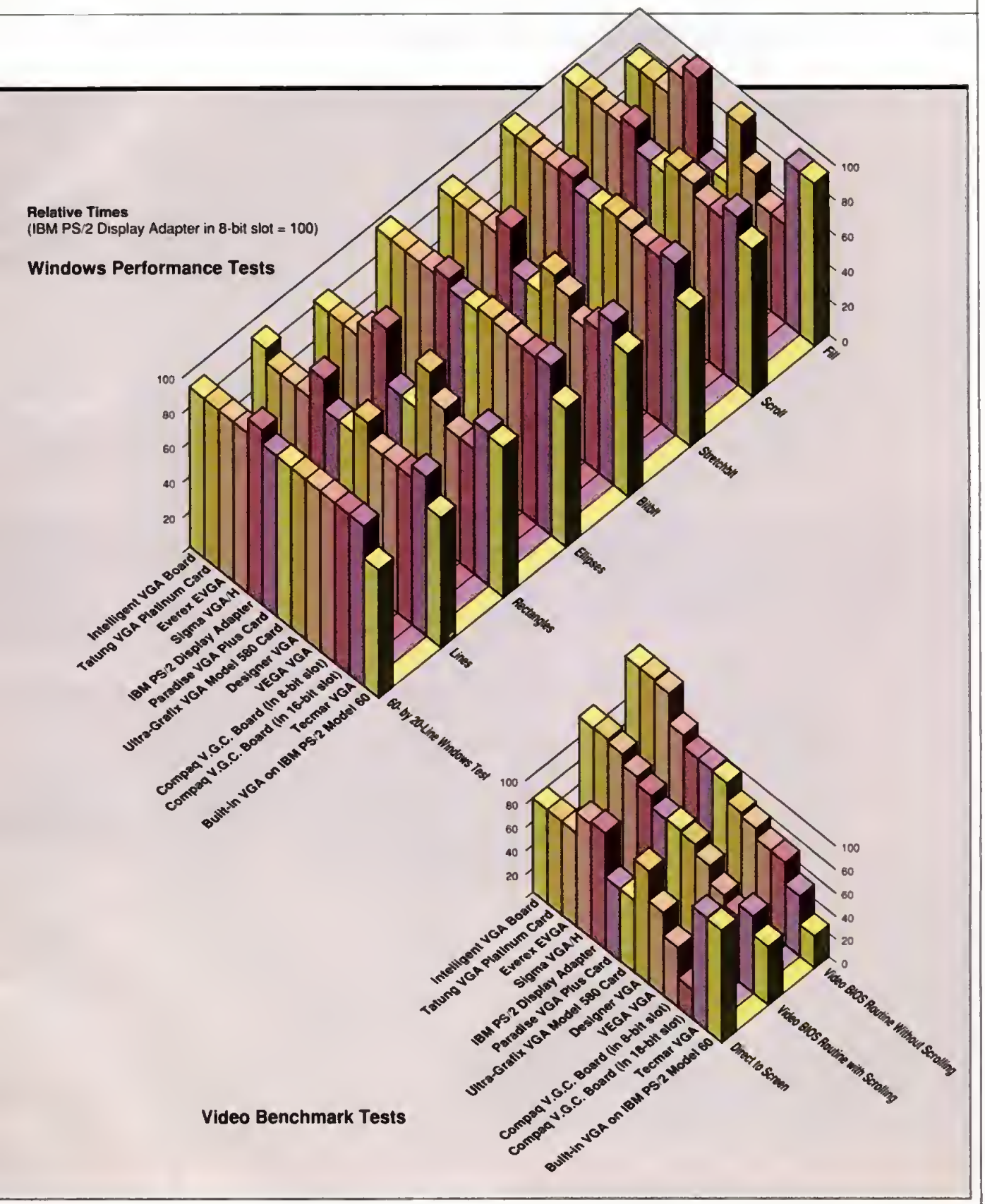
The **Direct to Screen** benchmark test measures the bandwidth of the video adapter by writing directly to the display memory buffer. The test is performed in video mode 3. The entire screen is updated using the assembly language REP STOSW instruction with register CX equal to 2000. This is done 1,000 times, and the result shown is the total of the 1,000 trials

The **Video BIOS Routine with Scrolling** benchmark test measures the speed of the BIOS Teletype routine with scrolling. The test is performed in video mode 3. The screen is cleared, and 240 lines of 60 characters each (including a terminating carriage return and line feed) are written to the display through the BIOS Teletype routine. Although the first 24 lines written to the display do not involve scrolling, all the remaining lines scroll the display

The **Video BIOS Routine Without Scrolling** benchmark test measures the speed of the BIOS Teletype routine without scrolling. The test is performed in video mode 3. The screen is cleared, and 24 lines of 60 characters each (including a terminating carriage return and line feed) are written to the display through the BIOS Teletype routine. This is done ten times, and the result shown is the total of the ten trials

Performance Times
(Times given in seconds except where noted)

	Windows Performance Tests (milliseconds)								Video Benchmark Tests		
		Full-Screen Windows Test									
	60- by 20-Line Windows Test	Lines	Rectangles	Ellipses	Bitblt	Stretchblt	Scroll	Fill	Direct to Screen	Video BIOS Routine with Scrolling	Video BIOS Routine Without Scrolling
Intelligent VGA Board	5.5	6.0	19.2	201.0	11.0	820.0	16.1	54.5	5.6	10.1	7.6
Tatung VGA Platinum Card	5.5	5.5	19.2	201.0	11.0	821.5	16.1	54.6	5.6	10.2	7.6
Everex EVGA	5.5	5.5	19.2	201.0	11.0	813.8	15.9	54.5	5.6	9.9	7.5
Sigma VGA/H	5.5	5.5	20.9	202.1	11.0	817.8	16.0	65.1	6.8	9.1	6.1
IBM PS/2 Display Adapter	6.0	6.6	23.1	208.7	12.1	836.0	16.6	69.9	6.9	8.6	5.6
Paradise VGA Plus Card	5.5	5.5	15.9	197.5	9.3	789.2	14.6	37.4	4.3	7.7	5.6
Ultra-Grafix VGA Model 580 Card	5.5	5.5	15.9	197.6	9.3	789.4	14.6	37.4	4.3	7.7	5.5
Designer VGA	5.5	6.3	22.0	202.1	11.3	819.3	15.9	65.2	6.8	7.6	4.6
VEGA VGA	5.5	5.5	18.7	200.1	10.6	810.8	15.7	50.2	5.0	6.9	4.7
Compaq V.G.C. Board (in 8-bit slot)	5.5	5.5	16.5	197.7	9.3	789.8	14.7	39.2	3.6	5.6	4.0
Compaq V.G.C. Board (in 16-bit slot)	5.5	5.5	16.5	197.7	9.9	789.8	14.7	39.2	1.8	4.8	4.0
Tecmar VGA	5.5	6.0	20.3	201.9	11.2	817.3	15.9	65.0	6.8	5.9	2.9
Built-in VGA on IBM PS/2 Model 60	4.4	4.9	19.8	165.9	9.9	655.3	14.0	65.0	6.7	4.3	1.5


Relative Times
(IBM PS/2 Display Adapter in 8-bit slot = 100)
Windows Performance Tests
100
80
60
40
20
Intelligent VGA Board
Tatung VGA Platinum Card
Everex EVGA
Sigma VGA/H
IBM PS/2 Display Adapter
Paradise VGA Plus Card
Ultra-Grafix VGA Model 580 Card
Designer VGA
VEGA VGA
Compaq V.G.C. Board (in 8-bit slot)
Compaq V.G.C. Board (in 16-bit slot)
Tecmar VGA
Built-in VGA on IBM PS/2 Model 60
Lines
Rectangles
Ellipses
BitBlt
StretchBlt
Scroll
Fill
60- by 20-Line Windows Test
Video BIOS Routine Without Scrolling
Video BIOS Routine with Scrolling
Direct to Screen
Video Benchmark Tests

What if there were more powerful forces at work?

Introducing the full range of Vectra PCs from Hewlett-Packard.

Exceptional power.

That's the defining characteristic of our new, comprehensive line of industry-standard PCs.

From the 20-megahertz 80386-based system, through the 12-megahertz 80286, to our entry-level and portable models.

And this line not only has the speed to get the job done, but the expandability, too.

For instance, the memory of our 12 MHz 80286-based model can be expanded up to 8 megabytes. And, importantly, all 8 can be accessed at the same 12 MHz for faster performance.

With eight expansion slots and up to 620 megabytes of mass storage, the 80386 models' built-in expandability will handle your most demanding applications.

But there's more than just power. There's the compatibility to meet today's standards while anticipating tomorrow's.

Both desk-top and floor-mount models support 5.25" and 3.5" internal flexible drives, while the 80286 and 80386 machines will run OS/2.

And every single HP Vectra PC offers something no other PC can: HP's

Mid-level, 80286 based

Entry-level, 8086 compatible

© Hewlett-Packard Co 1988 ISO2807

we never stop asking

"What if...?"

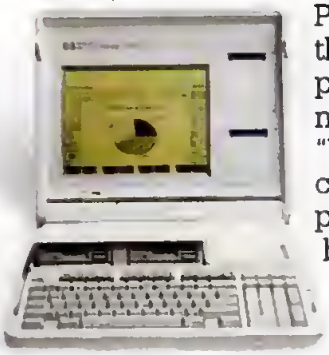
HP Vectra RS/16 and RS/20 Personal Computers
High-level, 80386 based
- Choice of 16 or 20 MHz, Intel 80386-based microprocessors
- Up to 620 Mbytes hard disc storage supported—17 millisecond average seek time for 100 through 620 Mbytes
- Up to 16 Mbytes of 32-bit memory using interleaved page-mode DRAM
- 8 accessory slots for expansion, 330-watt peak power supply, and six half-height mass storage shelves
- Both 5.25 and 3 5 inch flexible disc drives supported internally
- Separate mouse/graphics tablet port included
- Intel 80387 and Weitek 1167 co-processor support

HP Vectra ES and ES/12 Personal Computers
Mid-level, 80286 based
- Choice of 8 or 12 MHz, Intel 80286-based microprocessors
- Up to 8 Mbytes of expanded memory, accessed at 12 MHz in the Vectra ES/12 PC, supporting LIM 4 0 expanded memory specification without using I/O slots
- 7 accessory slots for expansion
- 20 and 40 Mbyte hard disc models
- Both 5 25 and 3.5 inch flexible disc drives supported internally
- Separate mouse/graphics tablet port included

High-level, 80386 based

long established reputation for quality and reliability.

Advanced surface-mount technology and VLSI are just two examples of how this reputation is being upheld.



Portable, 8086 compatible

PCs like this are the product of a philosophy that never stops asking "What if...?" to create a better computing tool for your business.

Just call for the location of your nearest HP sales office or dealer at: 1 800 752-0900, Dept. 709B.

More power to you.

HP Vectra CS Personal Computer
Entry-level, 8086 compatible
- 7 16 MHz, 8086-compatible microprocessor with zero wait states
- Up to 8 Mbytes of expanded memory, eddressable via LIM 3 2 expanded memory specification
- 7 eccessory slots for expansion
- 20 Mbyte hard disc model
- Both 5 25 and 3 5 inch flexible disc drives supported internally

HP Portable Vectra CS Personal Computer
8086 compatible
- 7 16 MHz, 8086-compatible microprocessor with zero wait states
- Up to 6 Mbytes expanded memory, addressable by LIM 3 2
- Four I/O slots
- Supports two 3 5 inch flexible disc drives
- 20 Mbyte internal hard disc model available
- Up to 10 hour battery life
- IBM style keyboard

AutoCad is a U S trademark of Autodesk, Inc
PageMaker is a U S trademark of Aldus Corp

HEWLETT PACKARD

CIRCLE 357 ON READER SERVICE CARD

Benchmark Tests: VGA Boards

	VGA Software Compatibility					VGA Hardware Compatibility							
	Color Bar	Character Set	Character Attributes	Line Pattern	DAC Palette	Direct Writes to Frame Buffer (20 modes)	Direct Palette Access	VGA Write Modes	Status Register	Vertical Blank Interrupt	Pan and Scroll	Programmable Character Generator	Split Screen
Intelligent VGA Board	Pass	Pass	Pass	Pass	Pass	Fail (mode 13)	Pass	Pass	Fail	Fail	Pass	Pass	Pass
Tatung VGA Platinum Card	Pass	Pass	Pass	Pass	Pass	Fail (mode 13)	Pass	Pass	Fail	Fail	Pass	Pass	Pass
Everex EVGA	Pass	Pass	Pass	Pass	Pass	Fail (modes 7, 15)	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Sigma VGA/H	Pass	Pass	Pess	Pass	Pass	Fail (modes 7, 13, 15, 16)	Pass	Pass	Pass	Fail	Fail *	Pass	Pass
IBM PS/2 Display Adapter	Pass	Pass	Pass	Pass	Pass	Fail (modes 7, 15)	Pass	Pass	Pass	Fail	Pass	Pass	Pass
Paradise VGA Plus Card	Pass	Pass	Pass	Pass	Pass	Fail (modes 7, 15)	Pass	Pass	Pass	Fail	Pass	Pass	Pass
Ultra-Grafix VGA Model 580 Card	Pass	Pass	Pass	Pass	Pass	Fail (modes 7, 15)	Pass	Pass	Pass	Fail	Pass	Pass	Pass
Designer VGA	Pass	Pass	Pass	Pass	Pass	Fail (modes 7, 13, 15, 16)	Pass	Pass	Fail	Fail	Fail *	Pass	Pass
VEGA VGA	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Fail	Fail *	Pass	Fail
Compaq V.G.C. Board (in 8-bit slot)	Pass	Pess	Pass	Pass	Pass	Fail (modes 7, 15)	Pass	Pass	Pass	Fail	Pass	Pass	Pass
Compaq V.G.C. Board (in 16-bit slot)	Pass	Pass	Pass	Pass	Pass	Fail (modes 7, 15)	Pess	Pass	Pass	Fail	Pass	Pass	Pass
Tecmar VGA	Pass	Pass	Pass	Pass	Pass	Fail (modes 13, 15)	Pass	Pass	Pass	Pass	Fail *	Pass	Pass
Built-in VGA on IBM PS/2 Model 60	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass

* Diagonal scrolling is jumpy

To define "true" register compatibility, it is necessary to first define compatibility itself. IBM has introduced two types of VGA, one with the on-board PS/2 VGA system and the other with its plug-in VGA card. Neither of these is totally compatible with the other on all levels.

In designing the VGA circuitry of their boards, many manufacturers have opted to use the plug-in IBM VGA card as their model. The PC Labs benchmark tests are based on the VGA environment of the Micro Channel PS/2 and were designed to test compatibility with this standard.

The contradictory result is that while the boards tested may indeed be register compatible with the IBM PS/2 Dispay Adapter, none is absolutely compatible with the built-in VGA system of the IBM PS/2 Model 60. As a practical matter, these VGA boards will work with applications that follow the less stringent plug-in VGA standard but may have problems with software that attempts to access the full range of abilities found in the built-in VGA system. For most applications, that level of compatibility should be good enough.

The nine boards tested passed all of the PC Labs VGA Software Compatibility tests, which means that their BIOS interface is consistent with the IBM definition. Programs adhering strictly to BIOS should run on any of these boards.

In the PC Labs VGA Hardware Compatibility tests, the built-in VGA on the IBM PS/2 Model 60 and Video Seven's VEGA VGA were the only boards to successfully display all 20 video modes. However, the VEGA VGA, which is perhaps best regarded as an enhenced EGA card thet should work with most VGA software, failed four out of the seven PC Labs VGA Hardware Compatibility tests.

Typically, boards that have failed the Pan and Scroll test can pan and scroll, albeit in a step pattern or with a certain degree of jumpiness. And boards that tailed the Status Register test could cause graphics-oriented video games to operate improperly.

Only the built-in VGA on the IBM PS/2 Model 60 passed ell of the PC Labs VGA Hardware Compatibility tests. Coming in right behind the PS/2 Model 60 is the Everex EVGA board, which only tailed modes 7 and 15 (which are monochrome modes) in the Direct Writes to Frame Buffer video modes test. The other modes that gave the boards some trouble were mode 13, the high-color mode (320 by 200 pixels in 16 colors) for EGA, and mode 16, the high-resolution mode (640 by 350 pixels in four colors) for EGA. Boards that failed mode 16 are not fully EGA compatible at the hardware level.

The IBM PS/2 Display Adapter, the Compaq V.G.C. Board, Taxan's Ultra-Gratix VGA Model 580 Card, the Paradise VGA Plus Card, and the Tecmar VGA ranked well overall, failing only two video mode tests and one other VGA Hardware Compatibility test. They are followed by the Tatung VGA Platinum Card and the Intelligent VGA Board, which failed one video mode test and two other VGA Hardware Compatibility tests.

The **VGA Software Compatibility** tests use the VGA BIOS to perform various operations, including displays of color bars, displays of characters, characters with various attributes, and an octagon made up of lines of various colors. These tests are similar to those used on the CGA and EGA. An additional color bar test in the 256-color VGA mode displays all colors at once. Programs that use only VGA BIOS calls should work with boards that pass the VGA Software Compatibility tests.

The **VGA Hardware Compatibility** tests bypass the VGA BIOS to go directly to the VGA hardware. They include writing directly to the VGA RAM, changing the colors of the display palette by using the digital-to-analog-converter (DAC) chip directly, selecting each VGA mode using hardware registers, and checking the on-board clock versus the PC's clock. The clock is used by some software to detect the vertical blank interval (VBI), which allows a program to update the screen without flickering.

The pan and scroll hardware support was tested along with split screen and programmable character generator support. These features are often used by high-end graphics packages and sophisticated terminal-emulator programs. Adapters that are only VGA BIOS compatible will probably fail one or more of the VGA Hardware Compatibility tests. Many programs, including *Microsoft Windows/386*, require hardware compatibility for VGA adapters.

the board to mimic any supported video standard. For instance, after you configure the VGA Plus with the program, your Hercules graphics programs will execute all their routines on your VGA display.

The VGA Plus has only one hardware jumper, which selects whether the board will have its 800 by 600 mode accessible or will keep its Video Feature Connector completely IBM compatible. The factory setting, high resolution enabled, should not be a problem because no accessories yet make use of the connector.

For true VGA hardware compatibility, the Paradise VGA Plus is a good choice. Its higher-resolution mode is a windfall for owners of MultiSync-style monitors.

MULTITUDE OF DRIVERS The high-resolution mode of the VGA Plus requires the use of a MultiSync-style monitor. In addition, your software must be compatible to take advantage of it. Paradise supplies drivers to handle *Microsoft Windows* (Version 2.0 only), *GEM*, *AutoCAD*, *CADvance*, *Ventura Publisher*, and *Framework II*. The VGA Plus also has two 132-column text modes, 25- and 43-row. Drivers are supplied to support *Framework II*, *WordStar*, Version 3.3; *WordStar Professional*, Release 4.0; and *WordPerfect*, all in 132-column mode.

The Paradise VGA Plus rates among the most compatible VGA boards available. It passed five out of the eight PC Labs VGA compatibility tests, displaying excellent scrolling capabilities in the split-screen test. Like the Taxan Ultra-Grafix VGA, its performance was among the best in the PC Labs *Windows* performance tests and average in the PC Labs video benchmark tests.

For true VGA hardware compatibility, the Paradise VGA Plus is a good choice. Its added higher-resolution mode is a wonderful windfall for owners of MultiSync-style monitors.

SIGMA DESIGNS INC.

Sigma VGA/H

The "H" in the name of the Sigma VGA/H must stand for "hardware compatible" in that Sigma Designs claims it to be hardware compatible with all IBM video standards as well as Hercules graphics. Moreover, it's the only VGA board compatible with digital input monitors that also includes a VGA-style Video Feature Connector. On the other side of the connection, the $399 VGA/H will mate with any PC or compatible, as well as PS/2 Models 25 and 30. It even stretches the VGA level of resolution up to 800 by 600 pixels in 16 colors when you have a MultiSync-style display.

The features of the VGA/H are brought to life with a Tseng Labs VGA chip, an Inmos DAC, and 256K of socketed 100-nanosecond DRAM chips. All fit on an 8¼-inch board that uses an 8-bit interface.

SUPPORTS MANY STANDARDS Sigma Designs claims hardware compatibility with MDA, Hercules Graphics, CGA, MCGA, EGA, and VGA display standards. In addition, it plugs into both digital and analog monitors using the female 9-pin and 15-pin D-shell connnectors on its retaining bracket.

Not all display standards are compatible with all monitor types, however. MultiSync-style displays will handle all modes of the VGA/H; IBM VGA displays will show everything (including Hercules Graphics) except the highest resolution modes. Other display types are limited basically to the standards for which they were designed (with a few exceptions).

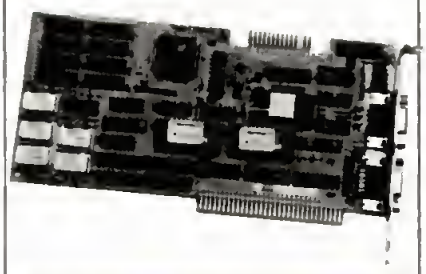
The VGA/H supports both 800- by 560- and 800- by 600-pixel 16-color graphics modes, as well as a wealth of 132-column text modes. Four of these produce 25 rows of characters, including modes for all monitor types except IBM VGA (including MDA, CGA, EGA, and MultiSync-style). Three modes allow 44 rows of text on MDA, EGA, and MultiSync-style displays. The VGA/H will also put monochrome VGA images on color VGA displays (and vice versa) without a complaint.

Setting up the VGA may require moving a single jumper or toggling some of the four DIP switches that can be seen through the retaining bracket of the card. No other adjustments are required.

ADVANCED MODES Sigma Designs does not include special drivers with the VGA/H, but instead relies on software to take advantage of its advanced modes. A utility called DISPLAY is included for switching display modes (with VGA- and MultiSync-style displays, most mode switching is automatic), blanking your monitor screen after a preset period, and booting games on the VGA/H using otherwise incompatible displays. Proprietary diagnostics are also included.

In testing, the VGA/H demonstrated hardware compatibility that places it in the top tier of the boards reviewed here. The board passed five out of eight of the PC Labs VGA compatibility tests and excelled

PC MAGAZINE FACT FILE



Sigma VGA/H
Sigma Designs Inc.
46501 Landing Pkwy.
Fremont, CA 94538
(415) 770-0100
List Price: $399
Requires: PC, XT, AT, or compatible, or PS/2 Model 30.
In Short: The only VGA add-in board compatible with digital input monitors that also includes a VGA-style Video Feature Connector, the Sigma VGA/H is compatible with all IBM video standards as well as Hercules Graphics and offers resolutions up to 800 by 600 pixels in 16 colors for MultiSync-style displays.

CIRCLE 695 ON READER SERVICE CARD

RESOLUTION À LA MODE

To help you compare VGA, EGA, and CGA output, we show the same image created in each of the three modes. The image, designed by PC Labs, was created using *Dr. Halo III* from Media Cybernetics and contains both type and a curved graphic to facilitate comparison.

In photo A, you can see the image in VGA's highest resolution mode, 640 by 480 pixels in 16 colors. The image in photo B was created in VGA's 256-color mode at a resolution of 320 by 200. Photo C shows the image in EGA's 16-color 640 by 350 resolution. Photo D shows the four-color 320 by 200 resolution of CGA. The curvature of the pie chart and of the block characters is smoothest in the highest resolution mode.

A

VGA: 640 by 480 pixels

C

EGA: 640 by 350 pixels

B

VGA: 320 by 200 pixels

D

CGA: 320 by 200 pixels

Look Smart. Be Smart.

Get Four LaserJetPlus/Series II Fonts for just $99.95.

Glyphix fonts work with Microsoft Word, WordPerfect, WordStar 2000, PageMaker, Ventura Publisher and more.

Choose from a menu of size and style options and get great looking results. Glyphix fonts offer 6 to 60 pt. type, 14 bold weights, condensed, expanded, screened, patterned, shaded type and more.

Glyphix™

The Smart Choice.℠

Compare & Save	Glyphix	HP	Bitstream
Fonts to 60 point	Yes	No	Yes
Degrees of bold	14	2	2
Patterned fonts	Yes	No	No
Expand & condense	Yes	No	No
300 DPI density	Yes	Yes	Yes
Typefaces per disk	4	2	1
Price	$99.95	$200	$190

BASICS
Roman
Helvette
Rockland
Chancelor

BOOK
Garamet
Basque
Palatine
Centrum

DECORATIVE
Coop
Abbey
Beget
Oma

BASICS II
Roman Italic
Amertype
Big City
Optimis

SANS SERIF
Avanti
Gillies
Olivia
Galaxy

FIXED
Courier
Prestige
Letter Gothic
Line Draw

Glyphix fonts require an 18M PC, XT, AT, PS/2 or compatible with 64K RAM, a hard disk drive; LaserJet Plus, Series II or compatible printer, MS-DOS 2.0 or later.

See Glyphix quality for yourself. Our demo disk prints our newsletter and samples of all fonts on your printer. Send $5.00 check or money order.

Swfte INTERNATIONAL LTD.
Post Office Box 5773
Wilmington, De 19808

Glyphix font disks contain four complete faces

- ☐ Basic Set — $99.95
- ☐ Book Faces — $99.95
- ☐ Decorative — $99.95
- ☐ Basics II — $99.95
- ☐ San Serif — $99.95
- ☐ Fixed Fonts — $99.95

Glyphix Font Managers are required for use with

- ☐ MS Word — $79.95
- ☐ WordPerfect — $79.95

ORDER TOLL FREE PCM 7/88

800-237-9383

IN DELAWARE CALL (302) 429-8434

Name _____

Company _____

Address _____

City _____ St _____

Zip _____ Tel. (___) _____-_____

Include $5.00 shipping and handling with your order
Add $2.50 for second item and each additional item.
All Swfte products come with a 30 day, money back guarantee

VISA MasterCard

Glyphix and *The Smart Choice* are trademarks or service marks of SWFTE International All other products are trademarks and/or registered trademarks of their manufacturers

© 1988 Fox Incorporated

CIRCLE 299 ON READER SERVICE CARD

No matter which of these modes you use,

40-column CGA Text
40-column EGA Text
40-column VGA Text
80-column CGA Text
80-column EGA Text
80-column VGA Text
Lo-res CGA Graphics
Hi-res CGA Graphics
MDA Monochrome Text
80-column VGA Monochrome Text
Lo-res MCGA Graphics
Lo-res VGA Graphics
Med-res VGA Graphics
EGA Monochrome Graphics
Hi-res EGA Graphics
Hi-res MCGA Graphics
Hi-res VGA Graphics

we have the VGA display for it.

Magnavox introduces two new Professional Series displays that are fully compatible with all 17 VGA modes—both designed with the intelligence you've come to expect from Magnavox.

With a VGA display system, you'll get the most out of your present software and prepare yourself for graphics environments like Windows 386, OS/2,™ and Presentation Manager.™ Resolutions include 720 x 400 for text, and 640 x 480 in 256 colors for graphics.

Both displays have a 14" CRT, versus the 12" industry standard. And both come with a built-in tilt/swivel base and are backed by a 2-year limited warranty—twice as long as most other brands.

At $249 for the paper-white monochrome and $649 for the color display, Magnavox makes VGA displays affordable.

MAGNAVOX
Smart. Very smart.

© 1988 Philips Consumer Electronics Company
A division of North American Philips Corporation
IBM OS/2 and Presentation Manager are trademarks of IBM Corp.

CIRCLE 101 ON READER SERVICE CARD

at the direct palette access test. Both BIOS and direct-memory-writing performance on the VGA/H was slower than average.

The VGA/H is the board to choose for upgradability. It will allow you to move up to new display standards whenever you can afford a new monitor. It's the only board that lets you go backward to a digital monitor or forward with its VGA Video Feature Connector.

TATUNG CO. OF AMERICA INC.

Tatung VGA Platinum Card

Platinum is useful and beautiful—the stuff of jewelry and catalytic converters. Tatung's VGA Platinum Card shares those qualities, if embryonically. The $449 board is a practical product that supports all major video standards from MDA up to VGA, extending up to 800 by 560 pixels in 16 colors. It's beautiful, too, in its ability to automatically adjust itself to the standard demanded by your software. But the raw metal in the Platinum Card needs more work to fulfill its potential.

The 7-inch-long Platinum Card is a product of technological convergence, built from both Chips and Technologies' VGA chip and ATI Technologies' VLSI circuit for lower-resolution work. Its 256K RAM is rated at 120 nanoseconds, and it uses an Inmos DAC.

REGISTER-LEVEL MATCH A register-level rather than hardware match for the VGA standard, the Platinum card's expansion connector follows the EGA standard. In fact, the Platinum Card claims full hardware compatibility with the EGA standard and only a BIOS-level match for the MDA, Hercules Graphics, and CGA standards. It even puts images from any standard up to EGA on lesser CGA displays and transposes monochrome VGA screens to color displays.

Both digital DB-9 and analog DB-15 connectors are installed on the Platinum Card's retaining bracket. An eight-bank DIP switch, accessible through a cutout in the bracket, adjusts the card to match monitors that don't fit the analog VGA standard. VGA-spec displays (but not MultiSync-style monitors) automatically take command and override the switch settings. An RF output for a television modulator is also available on the Platinum Card.

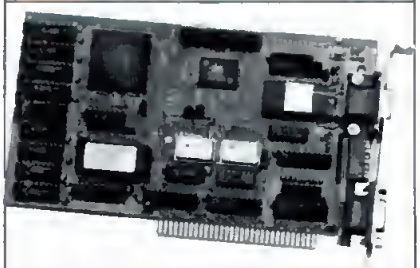
An entire row of badly documented jumpers lines the top half of the rear edge of the card. The accompanying manual lists the function of only one of the six sets, which sets the card's base address.

BEYOND VGA Beyond the VGA standard, the Platinum Card offers eight modes of its own. Four push horizontal resolution to 1,056 pixels to put 132 columns of text on MultiSync-style displays, at either 25 or 44 columns (200 or 354 pixels) deep. Also available are two 640- by 528-pixel modes. At its sharpest, the Platinum Card produces graphics at the odd aspect ratio of 800 by 560 in 16 colors.

Tatung supplies a control program that allows manual shifting of video modes and also includes a screen saver that blanks your monitor after a predetermined period of system inactivity. Programs supported by Tatung drivers include *AutoCAD, Microsoft Windows, GEM, Ventura Publisher,* and *Lotus 1-2-3* (in 132-column text mode).

Like IDS's Intelligent VGA Boards, the Platinum Card produced some of the slowest times in the PC Labs performance and benchmark tests. It also fared as well as the IDS board in passing most of the PC Labs VGA compatibility tests. All in all, the Platinum Card is not as lustrous as it could be. With some polishing, however, it could be a strong VGA contender.

FACT FILE



Tatung VGA Platinum Card
Tatung Co. of America Inc.
2850 El Prestdio St.
Long Beach, CA 90810
(800) 421-2929
(213) 979-7055
List Price: $449
Requires: PC, XT, AT, or compatible, or PS/2 Model 30.
In Short: A short card that's register compatible with the VGA standard and backward compatible with all previous major video standards and monitors. It offers several additional resolutions up to 800 by 560 in 16 colors.
CIRCLE 694 ON READER SERVICE CARD

TAXAN USA CORP.

Ultra-Grafix VGA Model 580 Card

Taxan's Ultra-Grafix VGA Model 580 Card earns its name by going beyond VGA hardware compatibility with an enhanced 800 by 600 16-color mode for MultiSync-style monitors. The $395 product also rates as a sub-VGA board, endowed with the ability to handle any major video standard below the VGA level—including MDA, CGA, MCGA, and EGA—and put a likeness of its images on any monitor it works with (VGA and analog MultiSync-style only). It plugs into nearly any PC (except for the early 64K system board model), XT, AT, PS/2 Model 30, or compatible.

Based on a Paradise Systems VLSI chip and an Inmos DAC, and equipped with 256K of 120-nanosecond memory, the Ultra-Grafix VGA Model 580 Card bears a striking resemblance to the Paradise VGA Plus. As with the Paradise board, the Ultra-Grafix VGA is 5¼ inches long and uses an 8-bit interface. It also includes an IBM-standard VGA Video Feature Connector at its top edge.

The only monitor connection supplied is a DB-15 connector suitable for analog VGA-standard monitors and MultiSync-style displays equipped with suitable adapter cables. The Ultra-Grafix VGA automatically senses whether it's attached to a color or monochrome VGA display and limits its VGA display modes accordingly. The board will, however, map Hercules monochrome graphics to a color VGA system.

EASY SETUP You won't have to endure any setup head-scratching when plugging in the Ultra-Grafix VGA. Since

If our new 286 computer is so terrific, why doesn't it cost more?

This handsome piece of high-tech wizardry is the new Dell System 220.

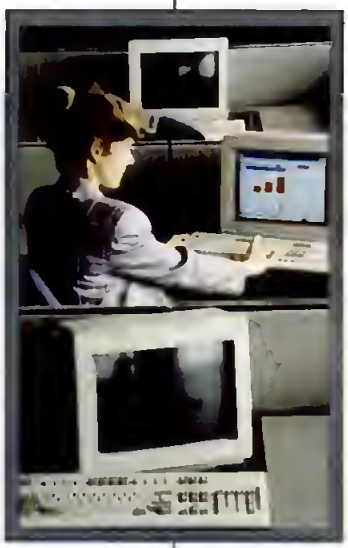
It's the first 286 computer that runs at 20 MHz.

Which means it's as fast as most 386 computers, running MS® OS/2 and MS-DOS® at blistering speed. All from a tiny corner of your desk.

Yet it costs less than half of what most 386 computers sell for.

Which might lead you, quite reasonably, to ask: How can Dell offer so much for so little?

Well, you buy direct from us, the manufacturer. Eliminating computer stores and their salespeople–who can add thousands of dollars to a computer's cost, and the hassle of a middleman.



"Speed is a good thing. Safe, reliable, no hassles speed is better still."–Al Poor, Editor's Choice, PC Magazine

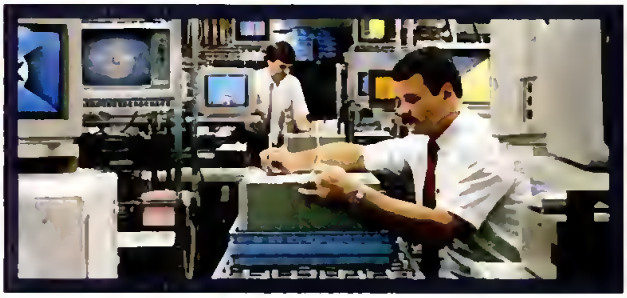
We design and build our computers right here in Austin. Putting a premium on speed, compatibility, and reliability.

We're already shipping our version of MS OS/2, so you can run OS/2 applications, now and in the future.

"...includes a year's on-site support...in the price of the computer. This is the sweetest support deal offered

by any computer vendor in the business."–Eric Knorr, PC World

And each computer goes through a battery of diagnostic checks, including a comprehensive burn-in before shipment.



In addition, every computer comes with a level of service most computer stores can only envy.

Including expert technical advice before you buy, and free technical phone support afterwards. Plus next-day on-site repair during the first year.

We also give you a thirty-day money-back guarantee, and a one year limited warranty.

"If your desire for speed is inexhaustible, (this is) the machine for you...it's reassuring when a computer completes some operations even before your fingers leave the keyboard."
–Harry Miller, PC World

As one of the largest personal computer manufacturers in the U.S., we've sold computers to large companies, small companies, and everything in between. Because of this, you can be confident we'll be here to support you now and in the future.

After all, we've been offering better computers, with better service–at better prices.

Now, if you'd like the rest of the details on our hyperfast 286 computer, and the rest of our line, there's only one more thing you have to do.

Turn the page.

CIRCLE 539 ON READER SERVICE CARD

The Dell Computer Store.

Welcome to our store. To buy or lease a Dell computer, call (800) 426-5150. We'll help you select the right system.

For service and technical support, call our highly trained technicians at (800) 624-9896. In almost all cases, any problem can be solved over the phone.

These technicians are also supported by Honeywell Bull service engineers who can be dispatched to your office by the next business day, should on-site service be required. This optional service contract is available in over 95% of the United States, with over 1,000 engineers in 198 service locations.*

We are so confident in our quality products that we also provide a Total Satisfaction Guarantee, which says that any system bought from us may be returned within thirty days from the date it was shipped to you for a complete refund of your purchase price.

We also offer a One Year Limited Warranty, which warrants each system we manufacture to be free of defects in materials and workmanship for one full year. During the one year period we will repair or replace any defective products properly returned to our factory.

Call or write for the complete terms of our Guarantee Warranty, and the Honeywell Bull Service Contract. Dell Computer Corporation, 9505 Arboretum Blvd., Austin, Texas 78759-7299.

Dell products are available on a GSA contract. Call us for GSA pricing.

THE NEW 20MHz 386 SYSTEM 310.

The top of the line. It's the highest performance 80386 computer available, faster than the IBM† PS/2† Model 80 and the Compaq† 386/20. It runs at 20 MHz, with the latest 32-bit architecture for maximum performance. And it's completely MS® OS/2 compatible. Since it also has Intel's† Advanced 82385 Cache Memory Controller, and high performance disk drives, the System 310 is ideal for intensive database management, complex research and development, CAD/CAM, and desktop publishing. As a network file server the system offers an unbeatable combination of price and performance.

Standard Features:

Intel† 80386 microprocessor running at 20 MHz.
1 MB of 80 ns 32-bit RAM expandable to 16 MB without using an expansion slot.
Advanced Intel 82385 Cache Memory Controller with 32 KB of high speed static RAM.
Socket for 20 MHz 80387 coprocessor.
5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
Dual diskette and hard disk drive controller.
Enhanced 101-key keyboard.
1 parallel and 2 serial ports.
200-watt power supply.
Real-time clock.
8 expansion slots (6 available with hard disk drive controller and video adapter installed).
Dell System Analyzer.
MS-DOS® and MS OS/2 compatible.
Security lock with locking chassis.
12 month on-site service contract (Available on complete systems).

Options:
1 MB RAM upgrade kit.
20 MHz Intel 80387 math coprocessor.
2 MB or 8 MB memory expansion boards.

SYSTEM 310	With Monitor and Adapter		
Hard Disk Drives	VGA Mono	VGA Color	VGA Color Plus
40 MB-28 ms	$4,099	$4,299	$4,399
90 MB-18 ms ESDI	$4,899	$5,099	$5,199
150 MB-18 ms ESDI	$5,399	$5,599	$5,699
322 MB-18 ms ESDI	$7,399	$7,599	$7,699

THE NEW 20MHz 286 SYSTEM 220.

As fast as most 386 computers, at less than half the price—more power for the money than any other system. An 80286 system that runs at 20 MHz, with less than one wait state. Completely compatible for both MS-DOS and MS OS/2 applications (it runs OS/2 faster than IBM PS/2 Model 80), and with a remarkably small footprint, the System 220 is the ideal executive workstation for database management, business, or sophisticated connectivity applications. The system uses page-mode interleaved memory; the page-mode RAM operates at less than one wait state, and inter-leaving results in a performance increase of about 15 percent.

Standard Features:

80286 microprocessor running at 20 MHz.
1 MB of RAM expandable to 16 MB (8 MB on system board).
Integrated diskette and VGA video controller on system board.
One 3.5" 1.44 MB diskette drive.
Integrated high performance hard disk interface on system board.
Enhanced 101-key keyboard.
1 parallel and 2 serial ports.
LIM 4.0 support for memory over 1 MB.
Real-time clock.
Three full-sized AT† compatible expansion slots.
Socket for 80287 coprocessor.
Dell System Analyzer.
MS-DOS and MS OS/2 compatible.
Security lock with locking chassis.
12 month on-site service contract (Available on complete systems).

Options:
3.5" 1.44 MB diskette drive.
Intel 80287 coprocessor.
1 MB RAM upgrade kits.

SYSTEM 220	With Monitor		
	VGA Mono	VGA Color	VGA Color Plus
One Diskette Drive	$2,299	$2,499	$2,599
40 MB-29 ms Hard Disk	$2,999	$3,199	$3,299
100 MB-29 ms Hard Disk	$3,799	$3,999	$4,099

THE NEW 12.5MHz 286 SYSTEM 200.

A great value in a full-featured AT compatible. An 80286 computer running at 12.5 MHz, this system is completely MS OS/2 compatible. It's ideal for general business applications, as well as software development, local area networks, CAD/CAM, and desktop publishing. The System 200 offers high speed drive options, industry standard compatible BIOS, and on-site service. At these low prices, the System 200 is the best value in the 80286 marketplace. As Executive Computing said of this computer's predecessor, "If faster processing speed and low cost are two key issues affecting your purchase decision, this machine might be the ideal choice for your office."

Standard Features:

Intel 80286 microprocessor running at 12.5 MHz.
640 KB of RAM, expandable to 16 MB (4.6 MB on system board.)
5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
Dual diskette and hard disk drive controller.
Enhanced 101-key keyboard.
1 parallel and 2 serial ports.
200-watt power supply.
Real-time clock.
6 expansion slots. (4 available with hard disk drive controller and video adapter installed).
Socket for 8 MHz 80287 coprocessor.
Dell System Analyzer.
MS-DOS & MS OS/2 compatible.
Security lock with locking chassis.
12-month on-site service contract (Available on complete systems).

Options:
512 KB RAM upgrade kit.
8 MHz Intel 80287 coprocessor.

SYSTEM 200	With Monitor and Adapter			
Hard Disk Drives	Mono	VGA Mono	VGA Color	VGA Color Plus
20 MB	$2,099	$2,299	$2,499	$2,599
40 MB-40 ms	$2,299	$2,499	$2,699	$2,799
40 MB-28 ms	$2,499	$2,699	$2,899	$2,999
90 MB-18 ms ESDI	$3,299	$3,499	$3,699	$3,799
150 MB 18 ms ESDI	$3,799	$3,999	$4,199	$4,299
322 MB 18 ms ESDI	$5,799	$5,999	$6,199	$6,299

THE NEW 8088 SYSTEM 100.

A full-featured, yet economical one-piece computer for office, school, or home. This system is fast, easy to use, and ready to run with Dell Enhanced MS-DOS 3.3, Microsoft® DOS Manager, and Microsoft Works software–more than a $400 value, included at no extra charge. Complete MS-DOS compatibility means you can run thousands of programs for business, personal finance, education, and entertainment. And the System 100 can grow, with the high quality options listed below. A price leader in 8088 technology, the System 100 boasts an innovative design that allows for more power, speed and convenience than most of its competitors.

Standard Features:

Intel 8088 microprocessor running at 9.54 MHz selectable to 4.77.
640 KB of RAM.
3.5" 720 KB diskette drive.
Diskette drive controller integrated on system board.
Integrated high-quality 84-key keyboard.
1 serial and 1 parallel port.
Two full-sized expansion slots available when video adapter is installed.
One half-sized expansion slot used for video adapter.
Socket for 8 MHz 8087 coprocessor.
Internal speaker with earphone jack and volume control.
Security Tie-Down bracket.
Dell Enhanced MS-DOS 3.3 Microsoft DOS Manager, Microsoft Works.

Options:
3.5" 720 KB diskette drive.
8 MHz Intel 8087.

SYSTEM 100	With Monitor and Adapter			
	Mono	CGA Color	VGA Mono	VGA Color
720 KB Diskette Drive	$1,099	$1,199	$1,299	$1,499
Two 720 KB Diskette Drives	$1,249	$1,349	$1,449	$1,649
20 MB Hard Disk	$1,599	$1,699	$1,799	$1,999

PRINTERS.

We now offer a full line of PC-compatible dot matrix and laser printers. Our dot matrix printers range from inexpensive near-letter quality printers to the highest resolution printers available. Our laser printers include some of the fastest, most reliable printers ever made. All are 300 dots per inch, and all support serial and parallel interfaces. And all printers come with our 30-day money-back guarantee and a one year warranty.

LASER PRINTERS

Laser System 150 $5,995
15 pages per minute, text and graphics
1.5 MB standard memory, expandable to 2.0 MB
Dual 250-sheet input trays

Laser System 80 $3,195
8 pages per minute text and graphics
1.5 MB standard memory, expandable to 2.0 MB

Laser System 60 $2,195
6 pages per minute, text and graphics
1.5 MB standard memory, expandable to 2.0 MB

DOT MATRIX PRINTERS

Printer System 800 $699.95
Highest resolution text and graphics from a 24-wire dot matrix printer
Draft quality at 200 cps
Correspondence quality at 132 cps
Letter quality at 66 cps
Standard parallel and serial interfaces
Wide carriage

Printer System 600 $499.95
9-wire dot matrix
Draft quality at 240 cps
Near-letter quality at 60 cps
Standard parallel interface
12.6 KB Buffer (expandable to 28.6 KB)
Wide carriage

Printer System 300 $199.95
9-wire dot matrix
Draft quality at 144 cps
Near-letter quality at 36 cps
Four standard fonts
Paper parking
4 KB buffer
Standard Parallel interface

PERIPHERALS.

With our unique manufacturing capabilities, we can build a system to your exact specifications. We offer monitors, modems, graphics boards, tape backups, hard drives, diskette drives, expanded memory boards, a serial mouse, and more. Call for details.

Operating System Software
Dell Enhanced MS-DOS 3.3 with disk cache and other utilities $119.95.
Dell MS OS/2 Standard Edition 1.0 $324.95

SOFTWARE.

Complete your system with software: accounting, communications, desktop publishing, graphics, home, spreadsheet, training, word processing, and integrated packages. Call for more information.

DELL COMPUTER CORPORATION

TO ORDER, CALL 800·426·5150 IN THE U.S. AND CANADA

All prices and specifications are subject to change without notice. Please inquire for current details. Dell cannot be responsible for errors in typography or photography. In Canada, leasing is not currently available, and configurations and pricing may vary. *Available on System 100 at extra charge. Microsoft,® MS,® and MS-DOS® are owned by Microsoft Corporation. †Signifies registered or unregistered trademarks owned by entities other than Dell Computer Corporation. ©1988 DELL COMPUTER CORPORATION.

AD CODE NO. 11B16

CIRCLE 536 ON READER SERVICE CARD

WHY SETTLE FOR A MERE VGA?

So you say that VGA is not good enough for you. You say you want more pixels—something like 1,024 horizontally and 768 vertically. And you also want more colors. You're dissatisfied that the VGA allows 256 simultaneous colors only with the puny 320 by 200 mode. You want 256 simultaneous colors at the full 1,024 by 768 resolution.

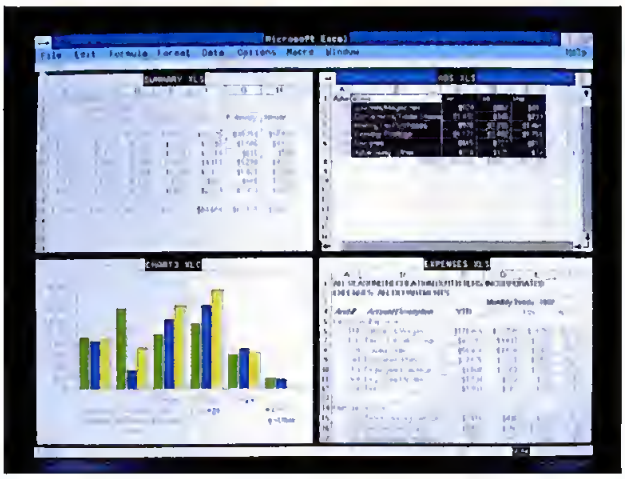
Remember this number: 8514.

The 8514/A Display Adapter, 8514 Memory Expansion Kit, and 8514 Color Display comprise IBM's high-end graphics video system for the PS/2 Models 50, 60, and 80. The maximum resolution is 1,024 by 768 with 256 colors selected from 262,144. The 8514/A also contains a graphics coprocessor that speeds up the drawing operation. Although it is a little high for most users, the $3,100 cost of the complete 8514/A system is competitive with other video boards and monitors of comparable resolution and color capability.

The 8514/A consists of two sandwiched boards that occupy a special slot in the PS/2 Micro Channel architecture bus. Although you can use any PS/2 monitor with the 8514/A, you need the 8514 Color Display for the 1,024 by 768 resolution.

MEMORY AND MODES The 8514/A comes with 512K of video buffer memory, organized in four color planes of 128K each. This gives you 16 simultaneous colors. The 8514 Memory Expansion Kit increases the on-board memory to 1MB. The extra memory adds four more color planes, for 256 simultaneous colors. (One megabyte is enough for a resolution of 1,024 by 1,024 with eight color planes; the 8514 can use the extra memory for storing fonts and bitmaps.)

The 8514/A supports only four graphics modes: a 640 by 480 mode and three 1,024 by 768 modes (each using a different font size). These are called the "advanced function" graphics modes. In the 1,024 by 768 mode, the display is interlaced but at a fairly high frame rate of 43 Hz. I did not notice any flickering.



Microsoft Excel *running under* Windows *on the IBM 8514/A Display Adapter. The 8514 driver will be available with* Windows *2.1.*

The 8514/A occupies a special bus slot with an additional connector that supplies video signals from the PS/2 system-board VGA to the 8514/A board. When the 8514/A is not in an advanced-function mode, it simply routes the video signals to the monitor attached to the adapter. Thus, the 8514/A does not replace the VGA but works in conjunction with it. You still have all the CGA, EGA, and VGA video modes supported by the VGA without any special VGA hardware on the 8514/A.

You can also use the 8514/A with two monitors. One monitor (usually the 8514 Color Display) is attached to the 8514/A adapter; the other (presumably one of IBM's other PS/2 color monitors) is connected to the VGA on the system board. For all the VGA video modes (including the CGA and EGA compatibility modes), both monitors show the VGA output. But when the 8514/A is switched into an advanced-function mode, the two adapters work independently. This flexibility is particularly useful in some dual-screen CADD programs or in program development work for running both a debugger on one screen and the program on another.

FUNDAMENTALLY DIFFERENT The biggest difference between the 8514/A and the VGA is the 8514 graphics coprocessor. The video buffer memory in the VGA is addressable by the PC's microprocessor like any other memory in the system. An application program writes text or graphics to the video display as if it were writing the characters or bits to memory. This configuration is simple enough, but it burdens the application program (or the graphics interface software) with the time-consuming job of writing the graphics images to the adapter memory.

The 8514/A is fundamentally different. The 1MB of video buffer memory in the 8514/A is *not* directly addressable by the PC's microprocessor. Instead, the board contains a graphics coprocessor that performs many high-level functions, including the drawing of lines (with selectable styles), filled areas (with selectable patterns), and text.

Basically, an application program tells the 8514/A board what to draw and the board does all the actual drawing. To draw a rectangle on the 8514, an application program need only specify the coordinate position of the upper-left corner, the width, the height, and the color. The graphics coprocessor does the rest.

FACT FILE

IBM 8514/A Display Adapter
IBM Corp.
Consult your local authorized IBM dealer.
List Price: $1,290
Requires: PS/2 Model 50, 60, or 80.
Options: The 8514 Memory Expansion Kit (required for 256 simultaneous colors rather than 16). The 8514 Color Display (required for 1,024 by 768 resolution)
In Short: The 8514/A is IBM's high-end video board for the PS/2 series. The resolution is 640 by 480 or 1,024 by 768 (depending on the monitor) with 16 or 256 colors (depending on the amount of memory on the board). The board includes hardware-assisted high-level drawing functions.
CIRCLE 661 ON READER SERVICE CARD

IBM 8514 Memory Expansion Kit
IBM Corp.
Consult your local authorized IBM dealer.
List Price: $270
Requires: The 8514/A Display Adapter.
In Short: Sixteen 32K graphics memory chips that plug into an 8514/A to give you 256 simultaneous colors rather than 16.
CIRCLE 660 ON READER SERVICE CARD

IBM 8514 Color Display
IBM Corp.
Consult your local authorized IBM dealer.
List Price: $1,550
Requires: PS/2 Model 30, 50, 60, or 80.
In Short: The 8514 display is the only PS/2 monitor capable of 1,024 by 768 resolution. It can be attached to any PS/2 computer, but it's really designed for use with the 8514/A adapter. IBM says the monitor measures 16 inches diagonally and provides "high contrast," but don't believe it.
CIRCLE 659 ON READER SERVICE CARD

THE PGC STORY The 8514 is not the first graphics coprocessor board IBM has offered for personal computers. When IBM introduced the EGA in 1984, it also introduced the Professional Graphics Controller (PGC). The PGC supported 640 by 480 resolution with 256 simultaneous colors—out of 4,096—and included a CGA-emulation (but not an EGA-emulation) mode. The board and monitor cost $4,300, and the board required two PC-XT or PC AT slots.

The PGC was a CADD board with sophisticated three-dimensional vector-based drawing functions. Although the PGC eventually was supported by many CADD applications (and also became something of a standard when certain video board manufacturers designed PGC superset boards), it had almost no mainstream application support.

One of the more serious deficiencies in the PGC was its inability to do bit-block transfers ("bitblts") between microprocessor memory and video memory. Bitblts are used quite frequently in windowing environments. For example, moving a mouse pointer across a graphics screen requires several bitblts for each new position of the pointer.

The high-level graphics functions in the 8514/A are not as sophisticated as those in the PGC. The 8514/A is rather a general-purpose graphics board and does only two-dimensional drawing. But it does support bitblts. The 8514/A is particularly well suited to a graphics-based windowing system such as *Microsoft Windows* or the OS/2 Presentation Manager. (The 8514/A will be supported under *Windows*, Version 2.1, and will quite likely be supported under the initial release of the OS/2 Presentation Manager, scheduled for October.)

DRAWING FUNCTIONS Controlling the drawing functions of the 8514/A is easily accomplished by making use of a high-level software interface—a RAM-resident program called HDILOAD .EXE that comes on a floppy disk supplied with the adapter board. The program is copied to the hard disk during installation and can be loaded into memory in the AUTOEXEC.BAT file. HDILOAD gives applications access to 59 high-level drawing functions. The entry points for these functions are obtained through software interrupt 7Fh.

For programmers who wish to explore the 8514/A, IBM sells a 52-page Programmer's Guide (including a disk with some utilities and demonstration programs) and a 140-page Technical Reference manual that documents the 59 functions. It's easiest to use the 8514/A software interface from programs written in C. Two C header files, an assembly language binding routine, and a demonstration program written in C are supplied with the 8514/A adapter.

The drawing functions have names such as HLINE (to draw a line) and HRECT (to draw a rectangular area). Each of these function names is actually a C macro that calls a function in the assembly language binding routine. The binding routine then calls the appropriate entry point in HDILOAD, and HDILOAD accesses the hardware of the 8514/A through registers.

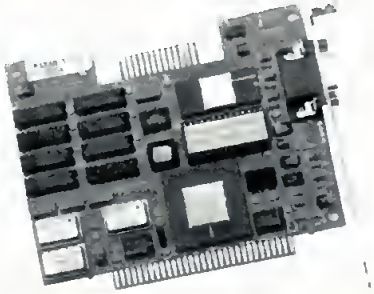
To test the speed of the 8514 graphics coprocessor, I wrote a C program that draws several thousand randomly sized rectangles filled with a solid, randomly chosen color. For the VGA in the 640 by 480 graphics mode, I used a highly optimized rectangle-drawing routine written in assembly language. For the 8514/A in the advanced-function 640 by 480 mode, I called the functions HSCOL (select a color) and HRECT (draw a rectangle) directly from my program.

LIBERATE YOUR PROCESSOR On a 20-MHz PS/2 Model 80, the VGA routine took an average of 8.3 milliseconds per rectangle. On the 8514/A, the time dropped to 2.7 ms. per rectangle, about three times as fast. Moreover, much of this time is spent by the 8514/A board doing the drawing. The PS/2 microprocessor is freed up after about 0.8 ms. Thus, the microprocessor actually spends about one-tenth as much time drawing the rectangle on the 8514/A as on the VGA.

With the introduction of the OS/2 Presentation Manager in October, graphics will become an increasingly important part of the PC's future. The 8514/A is the right board at the right time. It is not quite at the right price, but that problem is likely to be solved by other hardware manufacturers. Look for a lower-cost substitute for IBM's poor 8514 display in the near future, and at least one 8514/A clone after that.—**Charles Petzold**

Charles Petzold is a contributing editor of PC Magazine.

PC MAGAZINE FACT FILE



Ultra-Grafix VGA Model 580 Card
Taxan USA Corp.
18005 Cortney Ct.
City of Industry, CA 91748
(800) 544-3888
(818) 810-1291
List Price: $395
Requires: PC, XT, AT, or compatible, or PS/2 Model 30.
In Short: A VGA-hardware-compatible short card that offers backward compatibility with previous video standards along with an enhanced-resolution 800 by 600 mode in 16 colors. For VGA and MultiSync-style displays only
CIRCLE 693 ON READER SERVICE CARD

there's no need to select monitor types, it uses no DIP switches and only one hardware jumper, which selects whether the board will have its 800 by 600 mode accessible or keep its Video Feature Connector completely IBM compatible.

To switch the Ultra-Grafix between some of its modes, you must use a special utility program, VGAPLUS, that Taxan supplies along with the board. The 800 by 600 resolution mode of the Ultra-Grafix VGA requires you to have a MultiSync-style monitor and compatible software. Drivers are included with the board to enable the following program to use this ultra-mode: *Microsoft Windows* (Version 2.0 only), *GEM*, *AutoCAD*, *CADvance*, *Ventura Publisher*, and *Framework II*. In addition, drivers are included to use *Framework II*; *WordStar*, Version 3.3, *WordStar Professional*, Release 4.0, and *WordPerfect* in the two 132-column text modes (25- and 43-row) that the Ultra-Grafix VGA can display.

ABOVE AVERAGE In testing, the Taxan Ultra-Grafix VGA ranked above average in its VGA hardware compatibility. Its times in the PC Labs performance tests ranked among the fastest of the boards we tested. In the PC Labs video benchmark tests, the Ultra-Grafix was an average performer. And like the Paradise VGA Plus and Tecmar VGA, the Ultra-Grafix passed six out of eight of the PC Labs VGA compatibility tests, making it one of the most compatible boards that we tested.

Understandably, the Taxan Ultra-Grafix VGA rates as well as the very similar Paradise VGA Plus in VGA compatibility and performance because of the circuitry and chips the two boards share. If you have a VGA-style monitor, the Ultra-Grafix would be a good alternative to the IBM PS/2 Display Adapter. If you have a MultiSync-style display, its higher resolution capabilities make it an even better choice.

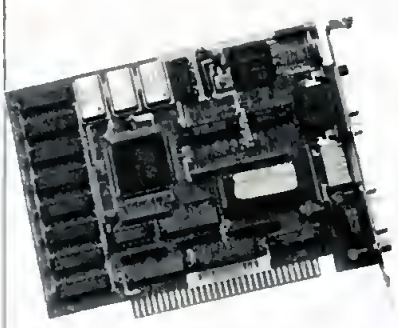
TECMAR INC.
Tecmar VGA

Building on past success with its Graphics Master, Tecmar has now nailed VGA register compatibility and even higher resolution—up to 800 by 600 pixels in 16 colors—onto its $395 VGA board. Along the way, the VGA has gathered up all lesser standards, including EGA BIOS compatibility and MDA, Hercules Graphics, and CGA register-level compatibility. The board works with nearly all non–Micro Channel IBM computers and compatibles, including all PCs (except for 64K system board models), XTs, ATs, and the PS/2 Model 30.

The 5.4-inch board misses full VGA hardware compatibility in that it lacks any provision for expansion at all, let alone a VGA Video Feature Connector. The Tecmar VGA is based on a Toshiba VLSI video chip and 256K of 100-nanosecond RAM. Conspicuously absent is the Inmos DAC used by IBM and all other clones. Both digital DB-9 and analog DB-15 output connectors are mounted on the card-retaining bracket.

SIX-BANK DIP SWITCH Peeking through a cutout in this bracket is the six-bank DIP switch that's used for setting up

PC MAGAZINE FACT FILE



Tecmar VGA
Tecmar Inc.
6225 Cochran Rd.
Solon, OH 44139
(800) 624-8560
(216) 349-1009
List Price: $395
Requires: PC, XT, AT, or compatible, or PS/2 Model 30.
In Short: A short card that's register compatible with the VGA standard as well as all major previous video standards and display types. Beyond the VGA standard, the board can achieve resolution up to 800 by 600 in 16 colors.
CIRCLE 692 ON READER SERVICE CARD

the Tecmar VGA. These switches are used to adjust for the monitor that's connected to the board and its default mode of operation. Unlike IBM-standard VGA boards, which automatically adapt to color or monochrome VGA displays, the Tecmar VGA requires that you set one of these switches as well as the single on-board jumper.

Once the host system is booted and running, the operating mode of the Tecmar VGA can be changed with a utility that's supplied with the board. This software enables the board to display text and graphics made by any supported video standard on any monitor that can be connected to it. The program, called VGA, is both command and menu driven, so it's easy to use and yet can be wielded in batch files as well.

Beyond the VGA standard, the Tecmar VGA supports graphics modes with either 800 by 440 or 800 by 600 pixels in 16 colors chosen from a palette of 64. In addi-

Coming from Lotus.

PC MAGAZINE EDITOR'S CHOICE

• Close but no cigar

If your goal is true VGA hardware compatibility with IBM's Personal System/2, you won't find a winner here. Although all of these VGA boards aspire to it, none really reach it. All of the products we examined suffer from at least one compatibility shortcoming, be it only in smooth diagonal scrolling.

Should you be willing to sacrifice the last iota of hardware compatibility—after all, there's neither guarantee nor threat that any software company will exploit all the VGA features we've tested for—you'll find plenty of good choices.

If you already have a VGA or MultiSync-style display (or regard getting one as an inevitability) and demand a VGA Video Feature Connector as a hardware compatibility prerequisite, try the Compaq, Paradise, Taxan, or Tecmar products; the Compaq (which was an Editor's Choice in the February 16, 1988, issue) is the top choice because of its speed.

If you want to plug your new VGA board into your display and upgrade later (but don't need a VGA Video Feature Connector), choose the IDS, Orchid, Everex, or Tatung. We give the edge to the IDS Intelligent VGA—despite its $50 price premium—because of its greater resolution potential, won with its 512K RAM.

Only the Sigma VGA/H offers both forward and backward hardware compatibility. If that's what you require, it's got to be your choice.

Because it fell furthest from the mark, we consider the Video Seven VEGA VGA only an enhanced EGA board with VGA BIOS compatibility. And the IBM PS/2 Display Adapter just costs too much.

tion, text modes with 100 columns by 43 or 55 rows and 132 columns by 25 rows are available. The beyond-VGA resolutions require MultiSync-style displays. With VGA-standard monitors, the maximum number of columns in text mode is limited to 120.

To accommodate the advanced resolutions and display modes of its VGA, Tecmar includes several drivers with it, all installable through the VGA program. Among these are drivers for *AutoCAD, GEM* (Versions 2.1 and 2.2), *Lotus 1-2-3* (Releases 1A and 2), *Symphony, Ventura Publisher* (Version 1.1), and *Microsoft Windows* (Versions 1.0 and 2.0). Tecmar also includes a GSS*CGI driver that supports several dozen CAD, scientific, engineering, and other graphics programs.

ALL IN ALL The Tecmar VGA turned in average performance in the PC Labs suite of performance and benchmark tests. It passed six of the eight PC Labs VGA compatibility tests, which means it keeps company with the Paradise VGA Plus and Taxan Ultra-Grafix boards. The Tecmar VGA is a very good product, albeit one that lacks expansion abilities. For some people, however, it may not prove to be as convenient as the automatically configuring boards that don't require running programs when switching from Hercules to VGA graphics. In most cases, however, you'll want to install your graphics software for the VGA standard, and you'll never need to switch.

VIDEO SEVEN INC.

VEGA VGA

The board for all seasons—any standard, any monitor, any time—that's what Video Seven's VEGA VGA promises to be. More than that, the $499 VEGA adds more resolution, colors, and columns to the existing standards and backs it all up with a 3-year hardware warranty.

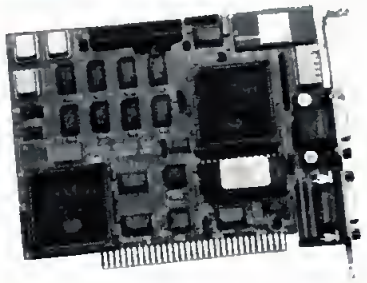
The VEGA supports MDA, Hercules Graphics, CGA, EGA, and VGA standards down to the hardware register level in any PC (except for 64K system board models), XT, AT, or PS/2 Model 30. Beyond the VGA standard, it offers 752- by 410- and 800- by 600-pixel resolution in 16 colors. In text modes, it permits up to 60 lines of 80-column text or 43 lines of 132-column text and up to eight simultaneous downloaded fonts. It lacks only the 640 by 480 MCGA two-color mode of the PS/2 Models 25 and 30.

Not only does the VEGA support all common monitor types up to their resolution limits, but it can also automatically discern between most of them and configure itself appropriately. Similarly, it automatically adapts its hardware mode to that of the software you're running.

COMPACT DESIGN All of these functions are achieved on an 8-bit card that's only 5.4 inches long, able to fit into XT short slots. Two proprietary Video Seven VLSI chips, an Inmos DAC, and a handful of surface-mount chips make up its circuitry. Its 256K of memory is rated at 120 nanoseconds.

Strictly speaking, the VEGA is register and not hardware compatible with the VGA standard. In place of the VGA Video

PC MAGAZINE FACT FILE



VEGA VGA
Video Seven Inc.
46335 Landing Pkwy.
Fremont, CA 94538
(800) 238-0101
(800) 962-5700 (in Calif.)
List Price: $499
Requires: PC, XT, AT, or compatible, or PS/2 Model 30.
In Short: A short card that's nearly register compatible with the VGA standard as well as all major lower video standards and monitor types. Capable of automatically setting itself for the proper type of monitor and display mode with resolution up to 800 by 600 in 16 colors.

CIRCLE **691** ON READER SERVICE CARD

© 1988 Lotus Development Corporation Lotus is a registered trademark of Lotus Development Corporation

Coming from Lotus.

The monitor that makes obsolescence obsolete.

MultiSync II

The world's best-selling color monitor, compatible with all leading graphics standards.

righted material

At NEC, we design our products with a simple principle in mind. What works well today should work just as well tomorrow.

And the MultiSync® II is no exception. It's a monitor that has proven itself compatible with all the leading computer systems. Including the PC/XT/AT/386 (and their 100% compatibles), PS/2 and Mac II. As well as all the leading graphics boards. So as technology continues to evolve you can be confident that the MultiSync II will be ready to meet the challenge.

The MultiSync II has an advanced ergonomic design that makes computing more comfortable. With a smaller footprint, upfront user controls, tilt-swivel base and a non-glare screen.

Best of all, it's from NEC. The company that not only invented the technology, but that also insures that your investment in it doesn't become obsolete. For literature or a dealer call 1-800-447-4700. For technical details call NEC Home Electronics (USA) Inc. 1-800-NEC-SOFT.

PC/XT/AT and PS/2 are registered trademarks of the International Business Machines Corporation

Mac II is a registered trademark of Apple Computer, Inc

NEC is a registered trademark of NEC Corporation

C&C
Computers and Communications

NEC®

CIRCLE 131 ON READER SERVICE CARD

5¼" External Floppy Drives for IBM® PS/2 Models

One Year Warranty!

Shipping: Add $10.00 per drive (UPS Ground)
Add $15.00 per drive (Federal Express Standard Air)
CA Resident Please Add 6.5% Sales Tax.

Dealer Inquiry Welcome!
Full Line of 3½" & 5¼" Disk Drives.

OPTIONAL 3½" / 5¼" DISK DRIVE SWITCH ADAPTOR IS AVAILABLE FOR THOSE PS/2 HAS TWO 3½" DISK DRIVES INSTALLED. THE PRICE FOR THIS ADAPTOR IS $40.00.

Order Now!

OUTSIDE CA
1-800-433-6224
INSIDE CA
1-800-553-6224

VISA MasterCard

No COD Order
Accept School's P/O

SEND MONEY ORDER OR CHECK TO:
KINSON PRODUCTS CORP.
260 S. LOS ROBLES, #107,
PASADENA, CA 91101.
For Inquiry please call (818) 792-8953

IBM PS/2 is the registered trademark of International Business Machines Corp
Terms 15% restocking fee on non-defective goods No return w/o RMA# No refund on shipping

CIRCLE 193 ON READER SERVICE CARD

■ VGA BOARDS

Feature Connector, it has a 32-pin connector that follows the EGA expansion standard. The VEGA also includes a header for an EGA-compatible light pen port.

Both DB-9 and DB-15 connectors for digital and analog displays are supplied. Digital monitors are limited to a 64-color palette even in VGA modes; up to 256 simultaneous colors can be displayed on analog screens. The 752- by 410- and 800- by 600-pixel modes require MultiSync-style displays.

COMPLEX CONFIGURATION Setting up the VEGA can be complex, owing to seven jumper sets and a six-bank DIP switch. The jumpers mostly are for configuring the VEGA to match your system—for instance, matching XT slot 8, changing the base address, and selecting whether you use a color or monochrome monitor. The DIP switches, accessible through a cutout in the card-retaining bracket, match some monitors that VEGA cannot discriminate between, defeat its automatic monitor-matching ability, and select the boot mode of the board between EGA/VGA mode and CGA/MDA mode.

Video Seven includes a general control utility, VEGA, that governs Hercules and CGA compatibility and incorporates a "screen-saver" function that blanks your monitor screen after a predetermined period of system activity. In addition, drivers for *AutoCAD* and *Lotus 1-2-3* (Releases 1A and 2), as well as an enhanced version of ANSI.SYS, come with the VEGA.

In the PC Labs performance and benchmark tests, the VEGA did not distance itself from the pack, turning in performance results that fell within the midrange of the boards we tested. Moreover, it demonstrated several problems when executing the PC Labs VGA compatibility tests and passed only four out of the eight tests. In that its hardware compatibility with the VGA standard is doubtful, the VEGA is perhaps best regarded as an enhanced EGA card that should work with most VGA software and will work with all VGA displays. If you have doubts, its money-back compatibility guarantee should reassure you.

Winn L. Rosch is a contributing editor of PC Magazine.

Open your windows faster.

Introducing the Paradise VGA Professional™ card. It gives you faster graphics than you've ever seen before.

Faster text. Even faster scrolling.

In fact, the VGA Professional is up to 400% faster than IBM's* PS/2* Display Adapter.

That's a serious headstart for your sales, marketing and financial reports.

The secret of our speed demon is a new 16-bit bus and 16-bit BIOS with AutoSense™ that rush your information through the video controller to the screen.

And delivers 256 colors simultaneously in 640 x 480.

VGA GUARANTEED 100% COMPATIBILITY

Or a big 132-column spreadsheet at a single glance.

And the VGA Professional card fits perfectly into your PC, AT* or XT* machine, as well as the PS/2 Model 30 and compatibles.

Call (415) 468-6692 and we'll tell you more about the new VGA Professional.

It's an open and shut case for better productivity.

PARADISE™
A Western Digital Company.

Paradise Systems, Inc.,
99 South Hill Drive,
Brisbane, CA 94005
(415) 468-6692.

© 1988 Paradise Systems, Inc.
VGA Professional and AutoSense are trademarks of Paradise Systems, Inc. *IBM and AT are registered trademarks, and PS/2 and XT are trademarks of International Business Machines Corp.

CIRCLE 359 ON READER SERVICE CARD

VGA

Princeton's Very Good Answers.

Without question, Princeton's PSC-28 and PSM-03 monitors will bring you the ultimate in VGA performance. Princeton was the first to offer truly compatible VGA dedicated monitors. Our PSC-28 is a 770 × 570, .28mm dot pitch, high resolution analog color monitor that can display an infinite number of colors. The PSC-28 also features a convenient color button for green, amber or cyan text. The PSM-03, a high resolution analog monochrome monitor gives you outstanding 800 × 630 resolution, and the ability to display infinite shades of gray. Plus sharp crisp graphics and character definition from its dynamic focusing circuitry.

Both monitors are compatible with IBM PC*, XT*, AT*, PS/2, Apple Macintosh SE* and compatible personal computers. Each gives you full compatibility with the leading VGA adapter cards including the QuadVGA and VEGA VGA. So if VGA meets all your needs (and you don't require the additional flexibility of our famous ULTRASYNC and MAX-15 autosynchronous monitors), investigate the cost/performance value of the PSC-28 and PSM-03.

Unsurpassed quality, service and performance make it hard to beat Princeton monitors. We offer better value than our competition. We call it the Visible Edge. For answers to all your questions about VGA compatible monitors, contact us at 601 Ewing Street, Building A, Princeton, New Jersey 08540 (609) 683-1660, x 811.

**Requires proper adapter card*

PRINCETON®
GRAPHIC SYSTEMS
AN INTELLIGENT SYSTEMS COMPANY

THE VISIBLE EDGE

CIRCLE 209 ON READER SERVICE CARD

PC COMMUNICATIONS COMES OF AGE

Script languages put the power of programmers' tools behind your communications tasks.

The process of transferring files from one PC to another is not the black art it once was. While programmers continue to dabble in protocol development, users have at their disposal an increasing number of tools and features aimed at making file transfers easier and more efficient.

A new generation of software has emerged to redefine the high end of the communications market. First on the scene were *Ascom IV*, *Relay Gold*, and *Relay Silver*, which supplemented the structure and command logic of their predecessors with new levels of functionality. Then came *Smartcom III* and *Crosstalk Mk.4*, sporting familiar names but bearing little resemblance to their older siblings. Two features in particular define this new generation of communications software: multitasking that permits multiple communications sessions (as in a multiuser bulletin board), background file transfer (while running another applications program), or both; and a script language that can rival programming languages for versatility.

In this issue we examine 21 programs with script languages you can use to automate your communications or even build new features into your system.

DESIGNER COMMUNICATIONS

The programs we reviewed—*Ascom IV*, *BitCom*, *Boyan*, *Crosstalk Mk.4*, *Crosstalk XVI*, *Freeway Advanced*, *HyperAccess*, *Lync*, *MEX-PC*, *Mirror II*, *ProComm*, *ProComm Plus*, *Professional-YAM*, *Ptel*, *Qmodem*, *Relay Gold*, *Relay Silver*, *Respond/Async*, *SideTalk*, *Smartcom III*, and *Softerm*—range in price from $35 to $250 and offer robust script languages that are suitable for general-purpose communications and that include commands for flow control and error handling. We did not look at programs with limited script languages that do little more than log on to a system.

Script languages fall neatly into three categories: minimal, advanced, and new-generation. Minimal script languages (such as those in *Boyan*, *Crosstalk XVI*, and *ProComm*) have relatively few commands and tend to be weak on flow control, error handling, arithmetic, file handling, and text manipulation. They will let you create scripts for straightforward communications tasks—such as logging on to a system or requesting information and capturing it to disk—but won't let you undertake an elaborate project like building your own bulletin board or set of menus.

Advanced script languages, like those in *SideTalk* and *HyperAccess*, are best thought of as communications-oriented programming languages, somewhat like *dBASE*'s database-oriented programming language. Most will let you build your own bulletin board or menus.

New-generation script languages are

the territory of the ground-breaking products like *Crosstalk Mk.4*, *Ascom IV*, *Smartcom III*, *Relay Gold*, and *Relay Silver*. They possess advanced script languages but also have more commands, so a given task can often be accomplished in fewer programming steps. *Smartcom III* even furnishes an on-line dictionary of commands and command syntax as an aid for writing scripts.

Many of the programs in all three categories offer a learn mode that creates scripts by recording both the user's keystrokes and the other system's response.

SPEED AND PROTOCOLS Script languages are undeniably useful but, when making a purchase, you must also be aware of the importance of protocols. More and better public-domain protocols are becoming widely available.

The ubiquitous Xmodem protocol is the only common tongue among communications programs, although Xmodem with CRC error checking tends to be more reliable, especially on noisy lines. However, Xmodem-CRC is marginally slower than standard Xmodem, so for transferring text on quality phone lines, Xmodem is probably the better choice.

Other Xmodem and Ymodem protocols offer batch file transfer and larger block size for faster file transfer. But if you need these, keep in mind that not everyone agrees on the names for these variations, which gives rise to some confusion. (For more information on protocols, see the diagram "Know Your Protocols.")

PROPRIETARY PROTOCOLS Several of the products we reviewed offer some noteworthy proprietary protocols. *HyperAccess*, for example, uses one that is optimized to work with high-speed modems but that, thanks largely to its data-compression techniques, offers impressive file transfer even at lower speeds. *Relay Gold* and *Relay Silver* furnish a proprietary protocol that can transfer files in both directions at once and still allow keyboard communications between systems.

Whether you're looking for lots of power and sophisticated features or ease of use and low price, you can probably find what you need among the products reviewed here.—**M. David Stone**

Ascom IV

Ascom IV, a $195 program from Dynamic Microprocessor Associates, is an old-timer among communications programs—its roots go back to CP/M. It doesn't sport the most modern accoutrements, but it is mature, solid, and compact enough to run from floppies.

To install, you copy the program to a hard disk and define the parameters of your communications environment. You can save configurations to files with different names, making it easy to maintain several different methods of connecting to a service. Similarly, you can specify an *Ascom IV* script for each entry in the dialing directory. This gives you flexibility in structuring your communication configurations. *Ascom IV* directly supports a wide variety of modems. There is a provision for enabling error correction, but only on Robotics and Microcom modems.

Ascom IV lets you list a series of files to either transmit or receive. It will process your lists sequentially, which can tremendously reduce the manual intervention needed to send multiple files. The program even checks to see that you won't overwrite a file on the receiving side and that the files exist on the transmitting side. *Ascom IV* maintains a log of all files received or sent and the status of the transmission (whether it was successfully transferred and, if not, why not).

Ascom IV uses function keys to navigate from mode to mode. The program usually displays the available function keys to remind you of your options, but not always: in some situations you simply have to remember the appropriate commands. A status line displays assorted messages; there's also a good, context-sensitive on-line help facility.

The terminal emulations include VT52, VT100, VT220, IBM 3101, ADM3A, Hazeltine 1500, Televideo 912, Data General Dasher 200 and ADDS Viewpoint. Similarly, the program supports a bountiful assortment of file-transfer protocols that include Xmodem, Xmodem-CRC, Xmodem 1K, Ymodem batch, and Kermit, as well as several proprietary protocols such as Ascom IV, Block, BlockV, and HSmodem for high-speed modems with error-checking hardware.

Ascom IV comes with log-on scripts for several commercial services; however,

FILE TRANSFER : LOG

#	FILENAME	TRANSFER STATUS	FILE SIZE	RE-TRY	START TIME	XFER TIME	DATE
1	APPBK.COM	RECEIVED	1792	0	12:03	00:20	12/27/87
2	APPBK.COM	RECEIVED	1792	0	14:03	00:12	12/27/87
3	ASC.COM	R-OPABORT	0	2	14:03	00:09	12/27/87
4	ASC.COM	RECEIVED	1280	0	14:04	00:00	12/27/87
5	DDIR.COM	R-OPABORT	0	1	14:04	00:05	12/27/87
6	DDIR.COM	RECEIVED	896	0	14:05	00:07	12/27/87
7	APPBK.COM	RECEIVED	1712	0	14:10	00:21	12/27/87

*** END OF LOG ***

View Log F3: Receive F4: Transmit <CUR UP>: Scroll Log Up <CUR DWN>: Scroll Log Down <End>: Exit

Alt-F1=MENU Alt-F2=CNFG Alt-F3=DIAL Alt-F5=TERM Alt-F6=CMND Alt-F7=FILE

One of Ascom IV*'s neatest features is a transaction log that saves information on all the files transmitted or received and notes whether each transfer was successful. The program even ascertains whether your transmission is overwriting a file on the receiving side.*

OUR REVIEWERS

Merv Adrian is a frequent contributor to *PC Magazine*.
Greg Alwang is a consultant with Soft Industries in Southington, Connecticut.
Patricia L. Becker is a consultant and writer at Soft Industries Corp., a Southington, Connecticut–based microcomputer consulting firm.
Bruce Brown is a principal at Soft Industries and a frequent contributor to *PC Magazine*.
Michael Brown is an accounting and microcomputer consultant based in Rockville, Maryland.
Kate Emery is a computer consultant with Soft Industries.
Glenn A. Hart is a contributing editor of *PC Magazine*.
David L. Hoffman is a microcomputer consultant and is vice president of the New York Personal Computer Users' Group.
Barbara Krasnoff, a frequent contributor to *PC Magazine*, is a former associate editor of *PC Magazine*.
Howard Marks is a New Jersey–based consultant specializing in communications and networks.
Alfred Poor is a senior consultant with Soft Industries and a frequent contributor to *PC Magazine*.
Alan Roth is a consultant with a New York telecommunications firm.
Walt Rowinsky is a free-lance technical writer based in Lakewood, Ohio.
John Schoenbeck lives and writes in Cleveland, Ohio.
Gary Stein is a computer and management information consultant in New York City.
M. David Stone is a contributing editor of *PC Magazine* and a consultant specializing in computer communications.
Donald B. Trivette is the author of *A Quick & Easy Guide to Dow Jones News/Retrieval*, published by Compute! Books.
Kenneth H. Werner is a software developer and the owner of a Houston, Texas, information consulting firm.

these only serve to get you logged on—no scripts to automate downloads or navigate through commercial services, for example, are supplied. The scripts included with some other advanced communications programs are far more sophisticated.

Ascom IV has its own editor for modifying scripts and for composing messages. One problem is *Ascom IV*'s consistent use of the End key to terminate operations. Although most editing commands are mnemonic, most PC editors use Home and End to move to the beginning and end of a line—a sure recipe for disaster in the *Ascom IV* editor. A few other commands aren't standard or easy to remember and aren't prompted anywhere on the screen (for instance, F6-Ins to insert a line). The files produced are standard ASCII, so you could use your own editor, but there aren't any provisions within *Ascom IV* to specify another editor as the default.

Ascom IV includes translation and filtration of both incoming and outgoing characters. An ASCII-to-EBCDIC configuration with the translation for this often-necessary mainframe conversion is supplied with the program.

SIMPLE FILE FOR BBS *Ascom IV* includes a much simpler script file to implement a modest bulletin board for sending and receiving messages. You can specify passwords, mailbox IDs, and one of three privilege classes for each approved caller. The highest priority class can gain access to *Ascom IV*'s internal DOS-like commands and can therefore send and receive files as well as messages.

The *Ascom IV* script language is more like assembly language than, say, BASIC or C. Hex constants are used, control characters must be inserted manually for return and line feed, and so on. As such, it's not as easy to learn or use as some other script languages. It's not particularly arcane or difficult if you've programmed before, but the novice may find *Ascom IV*'s script language tough sledding.

The language includes easy time and date manipulations, versatile communications and configuration commands, and very flexible file input/output commands. You can move within *Ascom IV*'s menu structure and modes and input or output to the screen or printer.

A reasonable assortment of DOS-like disk commands is available for file management. You can program subroutines, but the primary flow-control mechanism is via a comprehensive assortment of IF commands and GOTOs. This results in a lot of jumping around in the script code.

Scripts are parsed and compiled as they are loaded. You can precompile scripts if you wish and thereby speed up loading.

There are some oddities. For example, the manual refers to 300- or 1,200-bit-per-second modems, as if it hadn't been updated since 2,400-bps modems became widely available and inexpensive. Also, there are some errors in the script language examples. None of the rough edges were disabling, but we were surprised to see them in such a mature product.

Ascom IV offers a flexible script lan-

■ With *Ascom IV* you can precompile scripts if you wish and thereby speed up loading.

PC MAGAZINE FACT FILE

***Ascom IV*, Version 1.4**
Dynamic Microprocessor Associates
545 Fifth Ave., #1103
New York, NY 10017
(212) 687-7115
List Price: $195
Requires: 256K RAM, two disk drives, DOS 2.0 or later.
In Short: An old-timer with roots in CP/M and a spare user interface. Documentation needs updating, but script language will service users well. Not copy protected.

CIRCLE 690 ON READER SERVICE CARD

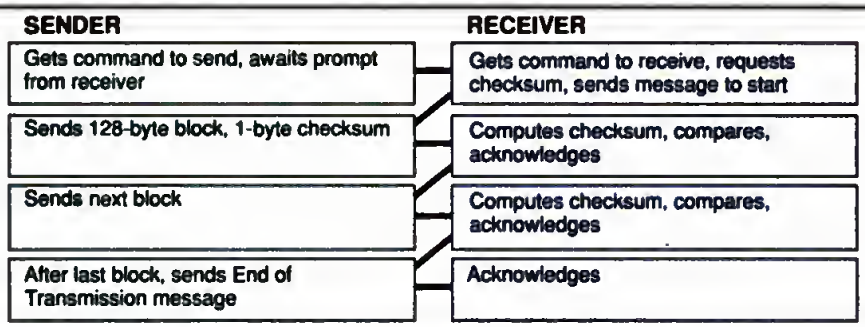
Know Your Protocols

From X to Z: a primer on what to expect—and what not to expect—from the protocol you're using.

Xmodem, Ymodem, and Zmodem protocols—with their variants, their similar names, and the debates over which name really goes with which protocol—can be a source of confusion in otherwise simple communications. Here's the lowdown on these protocols—what they are, what they do, and how they appear under other names. — **M. David Stone**

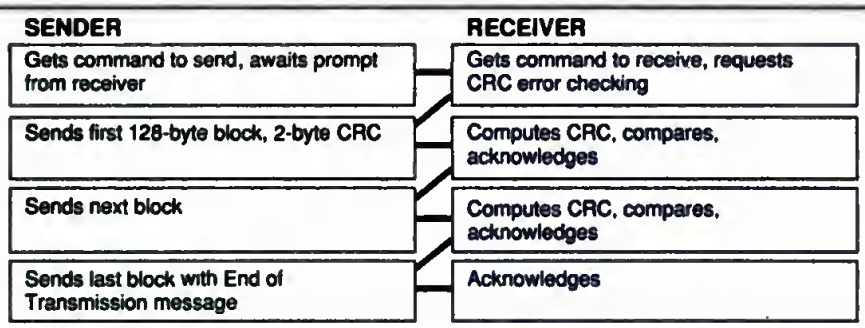
Xmodem

Xmodem is the common standard among communications programs. Every program reviewed here offers some version of Xmodem, which can fall back to checksum error checking.



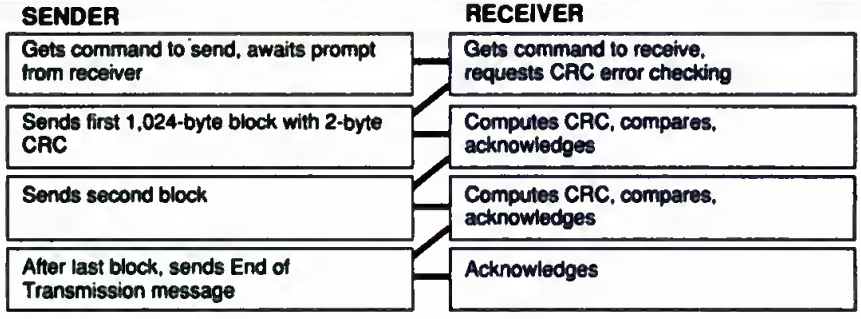
Xmodem-CRC

Xmodem-CRC (cyclic redundancy checking) is still around in versions with no fallback to checksum error checking, but most programs with Xmodem-CRC can fall back to checksum. With such programs, the receiving side requests CRC error checking, and then asks for checksum if it doesn't get a block in response to its first request.



Xmodem 1K

Xmodem 1K is widely known as Ymodem, although Chuck Forsberg, creator of Ymodem, insists that true Ymodem includes a batch file feature (see Ymodem batch). By either name, Xmodem 1K sends larger data blocks and thus allows faster transfer over good phone lines. In theory, Xmodem 1K can use CRC or checksum error checking, and any combination of 128-byte blocks and 1K-byte blocks. Actually, some versions of Xmodem 1K do not fall back to checksum error checking, and some will not accept 128-byte blocks.



Ymodem batch

Ymodem batch (Ymodem, according to Forsberg's definition) is equivalent to Xmodem 1K with batch file transfer. This protocol sends a header containing the filename along with the file itself. In some implementations, the header also includes the file size and date. (Otherwise, the file date becomes the date of transfer and the size is rounded up to a multiple of the block size.)

SENDER	RECEIVER
Gets command to send, awaits information from receiver	Gets command to receive, requests CRC error checking
Sends filename and other header information, 2-byte CRC, and first 1,024-byte block	Computes CRC, compares, acknowledges
Sends next block	Computes CRC, compares, acknowledges
After last block, sends End of Transmission message	Acknowledges; requests next file with CRC error checking
Sends filename and other header information, 2-byte CRC, and first 1,024-byte block	Computes CRC, compares, acknowledges
After last block, sends End of Transmission message	Acknowledges; requests next file
Sends null pathname to indicate no more files	Acknowledges

YmodemG

YmodemG is a streaming protocol, built around the philosophy that no news is good news. It sends the entire file before waiting for an acknowledgement. If the receiving side detects an error in midstream, it aborts the transfer. YmodemG is not an error-correcting protocol; it is designed for use with high-speed modems, which have built-in error-correcting protocols.

SENDER	RECEIVER
Gets command to send, awaits prompt from receiver	Gets command to receive, requests streaming option with CRC error checking
Sends first filename and other header information, 2-byte CRC	Gives message to continue
Sends first 1,024-byta with block 2-byte CRC; sends second block; after last block, sends End of Transmission message	Acknowledges; requests next file with streaming option and CRC error checking
Sends second filename and other header information	Gives message to continue
Sends first end subsequent blocks; after last block, sends End of Transmission message	Acknowledges; requests next file with streaming option and CRC error checking
Sends null pathname to indicate no mora files	

Zmodem (full streaming)

Zmodem is e streaming protocol that allows for error correction and error detection. The receiver can interrupt to request retransmission of garbled data. Zmodem is fast and is reliable on poor lines. If a link is broken during a transfer, Zmodem can redial and pick up the transfer without having to stert over. Zmodem aiso includes file-management capabilities.

SENDER	RECEIVER
Sends Reedy message, calls receiver	Tells sender which options the receiver possesses
Sends list of options to use, as well as header information	Tells sender to start transfer
Sends data header, data subpacket 1, and subsequent subpackets, followed by End of Trensmission message	Acknowledges file; requests next file
Sends list of options to use, as well as header information	Tells sender to start transfer
Sends data header, data subpacket 1, and subsequent subpackets, followed by End of Trensmission message	Acknowledges file; requests next file
Sends End of Files message	Acknowledges

guage and interesting and useful features (especially the multiple file specifications and transfer log). Its user interface is not as slick as that of some competitors, but it's workable. Its documentation is dry but complete. Overall, it's more suited to experienced users.—**Glenn A. Hart**

.....

BitCom

If you bought a modem recently, you may have found a copy of *BitCom* at the bottom of the box. Fourteen modem distributors are bundling the program with their products, but even if *BitCom*, Version 3.5, doesn't come free to you, it's a good value at its list price of $69.

Version 3.5, a menu-driven program with a script language powerful enough to automate most communications tasks, is easy to start and easy to use. It supports the full Hayes command set, as well as transmission rates of 110 to 19,200 bits per second. It has built-in buffers and Xon/Xoff flow control, and its vendor, BIT Software, claims compatibility with 386 machines and the PS/2 series.

To get started, you copy *BitCom* onto a backup or, preferably, a hard disk, then enter "bitcom" at the DOS prompt. An opening menu presents four selections: go to the telephone directory, invoke a Script file, change the program's configuration, or issue a DOS command. Although *BitCom* does not come with a tutorial, it does offer context-sensitive on-line help on the F1 key, with complete information about the current screen and all selections and parameters. You'll find available operations indicated at the bottom of each screen.

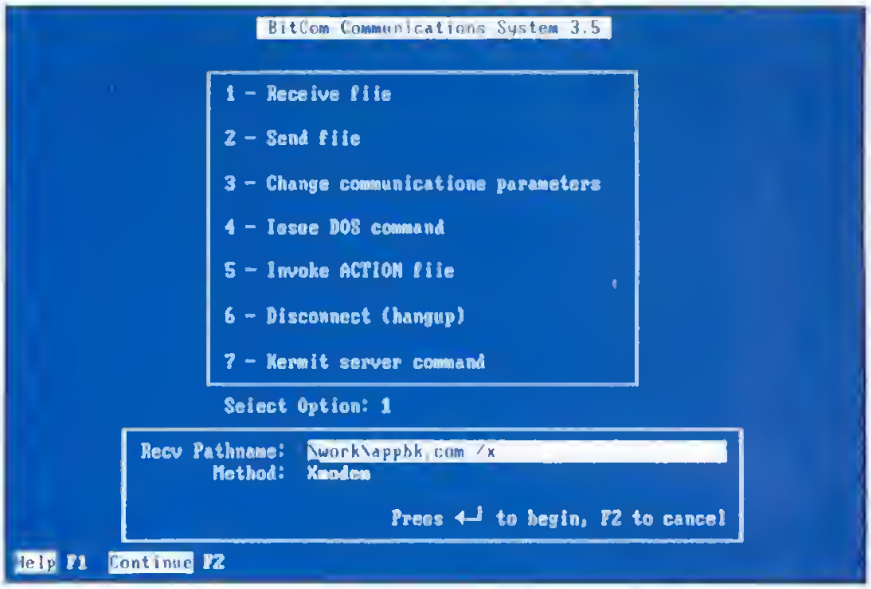
You can keep as many as 32,000 listings, with phone numbers as long as 40 digits, in the directory. You invoke function keys and follow the instructions that appear on the screen to add or delete numbers. Other fields can be changed from default values as necessary, and you can edit the parameters at any time—even during a connection. For most fields, *BitCom* offers a series of appropriate values that are rotated or toggled by using cursor keys.

BitCom will redial until a connection is made. You can write a script to link numbers, so that if one is busy the next will be dialed. You can also dial from the DOS prompt and bypass the menus by entering "bitcom" and the record ID.

Once the connection is made, hitting the F2 key brings up an options menu, where you can choose to send or receive a file, change parameters, issue a DOS command, invoke a script file, or disconnect. You can specify a filename and capture the session, or you can save a screen snapshot with the press of a function key.

BitCom will allow you to change protocols before sending or receiving a file. After you enter the protocol and a pathname, the transfer begins. If you wish, you can automate the process by assigning file send/receive commands—including a prompt to request the pathname—to function keys. Some of the protocols *BitCom* supports include Xmodem with checksum, Xmodem-CRC, relaxed Xmodem, Xmodem 1K, Ymodem batch, and (new in Version 3.5) Kermit.

RUNNING APPLICATIONS If you invoke DOS, commands are executed in a DOS shell rather than from within *BitCom*, and when finished you must hit the



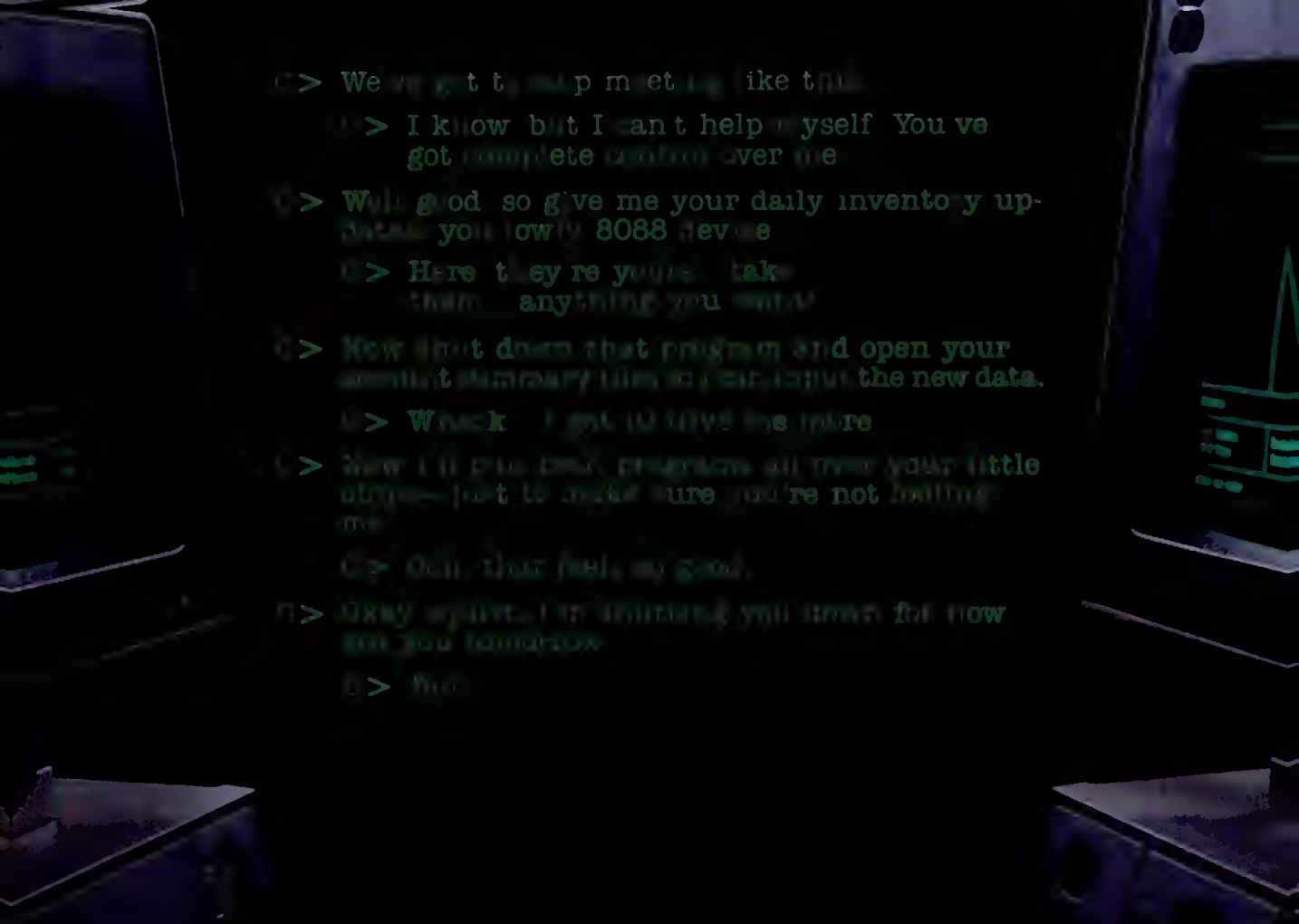
During communications you can use the options menu to send or receive files, and BitCom *will prompt you for the filename and allow you to change the protocol. You can automate this process by assigning send/receive commands to function keys.*

■ *BitCom* features a script language powerful enough to automate most communications tasks.

PC MAGAZINE FACT FILE

***BitCom*, Version 3.5**
BIT Software Inc.
830 Hillview Ct., #160
Milpitas, CA 95035
(408) 263-2197
List Price: $69
Requires: 256K RAM, one disk drive, DOS 2.0 or later.
In Short: Friendly menu format and 50 pages of on-line help make this a good choice for novices. Script language is difficult to master but strong enough to automate most tasks, including remote file transfer. Not copy protected.

CIRCLE 689 ON READER SERVICE CARD



It's More Than Just Two PCs Talking In The Night.

It's Totally Automated, Unattended File Transfer and Remote Control. And you don't have to be a programmer to use it.

If you've ever tried to use a "standard" communication program to create script files for automated, unattended PC-based communications, you'll really appreciate CCExpress from Meridian Technology, makers of Carbon Copy Plus.

And if you're not a communications expert, that's fine. CCExpress allows you to easily create task lists that activate your computer at a later time. You can update data files or remotely execute programs—at night—when telephone rates are low and computer usage is at a minimum and you're busy doing something important—like sleeping.

CCExpress is ideal for branch offices or other remote locations that regularly need to transfer data or update programs with other PCs. Using unattended remote emulation you can do the same with minis or even mainframes. Of course, since CCExpress is optimized for unattended operation, it includes special features such as error recovery, results log, data encryption and password security.

So if you're looking for an easier, more cost-effective way to transmit large amounts of data, take a closer look at CCExpress. And let your computer work while you sleep!

CCExpress

MERIDIAN TECHNOLOGY INC
A SUBSIDIARY OF MICROCOM
7 Corporate Park, Suite 100, Irvine, CA 92714, (714) 261-1199

CCExpress includes a copy of Carbon Copy Plus
CCExpress is a trademark of Meridian Technology

CIRCLE 228 ON READER SERVICE CARD

The software behind the hard copy.

Their diversity is remarkable; their loyalty, intense. Every day, the list grows longer. Every day, the accolades pour in. From publishers, writers, lawyers, managers, technicians—and especially software reviewers—XyWrite III Plus is universally acclaimed as the preeminent word processor available today. Listen to the praise:

"Crisp. Powerful. In a class by itself."

"Customer suppart is friendly, forthright, patient."

"Every document in (PC Magazine) is edited using the fastest, most powerful word processor on the market: XyWrite III Plus."

"A fine flexible tool; it lives up to its promotion and reviews."

"XyWrite III Plus is perfection."

Feature-laden. Flexible. Powerful and responsive. Discover for yourself why so many publications, corporations, and professional writers depend on XyWrite III Plus.

For more information or the name of a dealer near you, write: XYQUEST, Inc., 44 Manning Road, Billerica MA 01821. Or call 617-671-0888.

XyWrite. For people who write.

PC MAGAZINE EDITORS' CHOICE

Software Digest

#1 RATED ADVANCED WORD PROCESSOR, 1988

CIRCLE 518 ON READER SERVICE CARD

Enter key to return to the communications screen. You can select the DOS option and run a program during a communications session, but you cannot do so while transferring a file.

BitCom distinguishes Action files (which are invoked automatically to perform tasks after a connection has been made) from Script files (which control when to call a number, how many times to retry, and what to do if the connection is or is not established). You can use a Script file to make the connection, and an Action file will then be invoked if it is specified in the parameters. These files cannot be created within *BitCom*, which does not have a text editor. Automatic log-on to a host requires an action file to be invoked. If your log-on involves a password, it unfortunately can be seen by anyone who accesses the file from the DOS prompt.

The script language offers more than 80 functions and allows you to nest as many as eight subroutines. While basic communications functions are simplified by the menus, script files allow *BitCom* to be set up for people who don't want to learn a communications program. Prewritten script samples are included for dialing numbers, for receiving and sending files (including selection of protocols), for logging on to an information service (specifically CompuServe), and for automatic answering. These examples cover the major functions of the program, and they are made even easier by the manual, which includes a list of the files on the disk.

The manual does not discuss more-sophisticated applications such as making multiple unattended contacts with file transfers or screening callers for passwords, but it does refer you to the samples for guidance in accomplishing these and similar functions. The script language can handle a wide variety of tasks involving conditional statements, function calls, and responses to your input at prompts. Clever use of the script will expand *BitCom*'s powers substantially, but if you really need these applications, you might want to find a program that includes them.

We found documentation on the script language more suited to the experienced user than to the beginner, and certain key bits of information were not in the manual. Nowhere, for example, could we find which bps rates were available in *BitCom*.

BitCom is not difficult to learn, which makes it very useful to novices and those who need a communications program to execute standard tasks, but its script language may not be rich enough to satisfy more-advanced users.

—John Schoenbeck

.....

Boyan

College student Justin Boyan and his $35 communications program named *Boyan* justify one of our most cherished beliefs: once in a while, out of the blue, a little guy can come up with a good product and make a buck at it. Distributed as shareware, *Boyan* is a top-quality package for the budget-conscious.

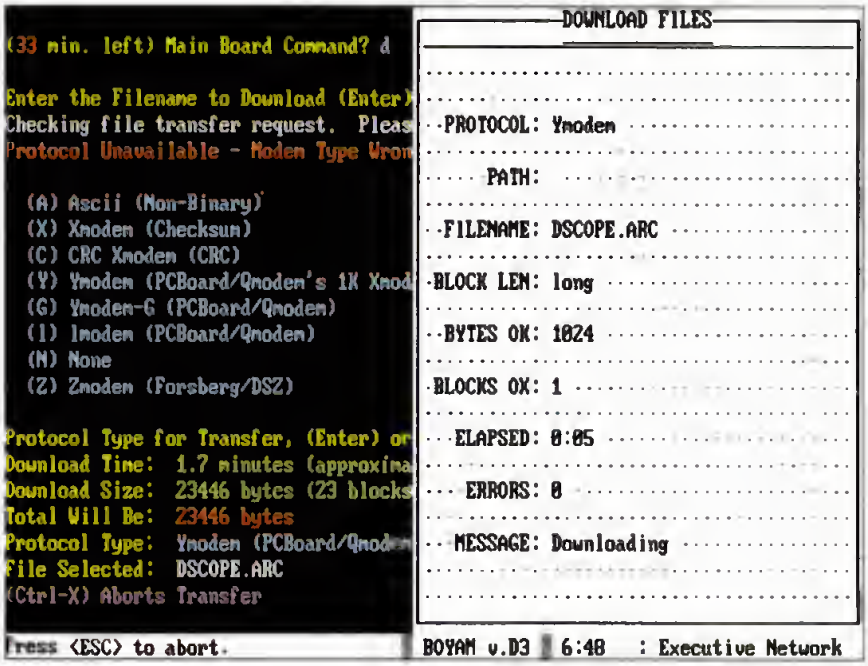
In these days of inflated program size, *Boyan*'s requirements seem minuscule. It can run on a system with only one disk drive. Laptop users will applaud its small appetite.

The program consists of two files: BOYAN-D3.EXE, which "unarchives" itself into all the files you'll need to run *Boyan*, and BOYAN-D3.DOC, the 60-page manual. We had it up and running in less than 20 minutes—without consulting, or even printing out, the manual.

The sign-on screen reminds you that the author is just a starving student and you really ought to send him the measly $35 fee if you haven't done so already. Next, you drop right into terminal mode. As this screen informs you, you can press Ctrl-Home to get one of the 16 context-sensitive help screens.

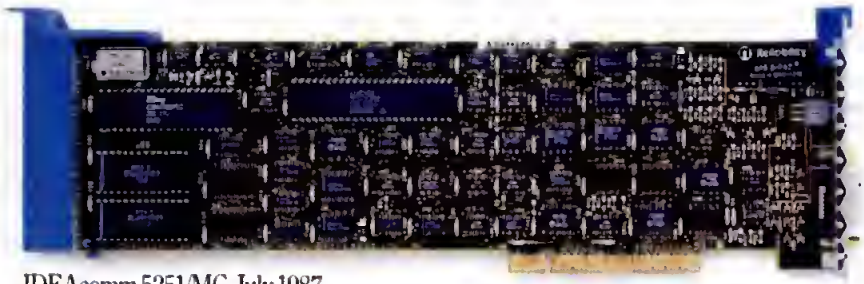
Hitting Alt-C brings up the configuration menu. *Boyan* supports Hayes-compatible modems by default, but you can modify all the command and response strings to match those of practically any other modem. (*Boyan* supports modem speeds only up to 9,600 bits per second and only on COM1 or COM2; if you plan to use that wild new 115,200-bps modem on COM3, you'll have to find another communications program.)

Unlike some programs, *Boyan* automatically sets the character length to 7 bits if you're using even or odd parity, and 8 bits if using no parity. These combinations are the most common, but we'd prefer to have the option of setting the two parameters separately.

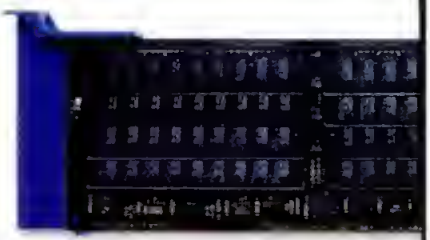


After you hit PgDn for a file download, Boyan *scans the screen buffer for the name of the file you're downloading to save you from typing it twice. On the left of the screen are the protocols the program supports.*

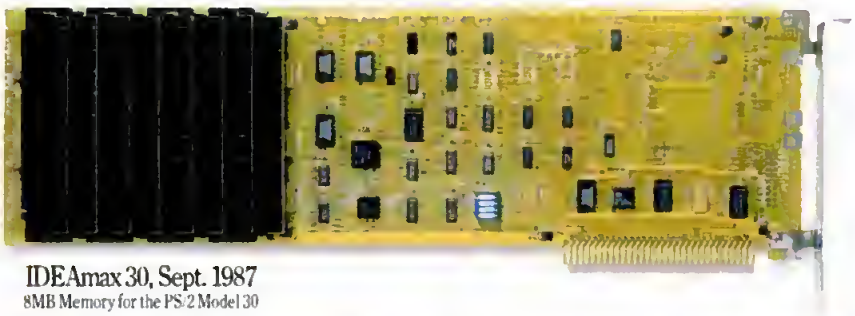
Every time IBM giv we're the first



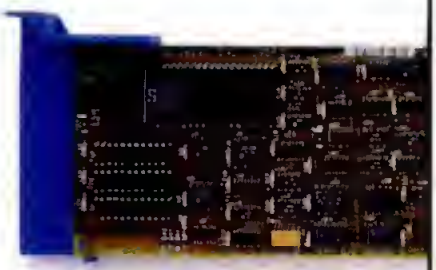
IDEAcomm 5251/MC, July 1987
Local 3X Communications for the IBM PS/2



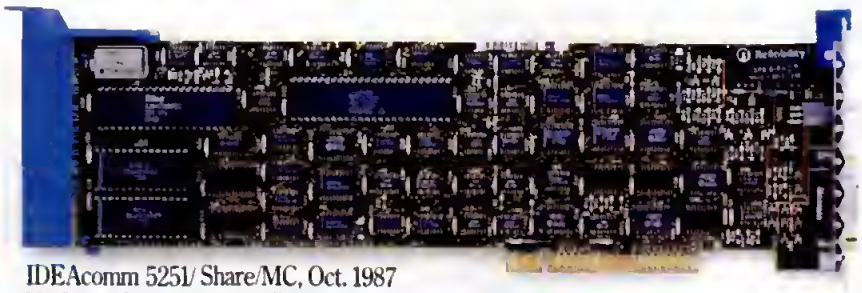
IDEAmax/MC, Oct. 1987
12MB Memory for the IBM PS/2



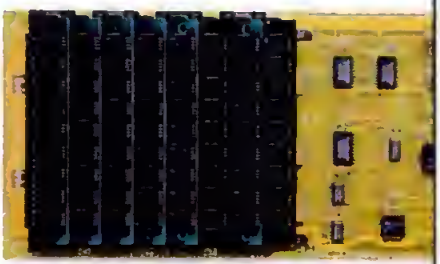
IDEAmax 30, Sept. 1987
8MB Memory for the PS/2 Model 30



IDEAcomm 3278/DFT/MC, Nov. 1987
Local Mainframe Communications for the IBM PS/2



IDEAcomm 5251/ Share/MC, Oct. 1987
PS/2 Gateway Communications to the IBM System 3X



IDEA Supermax 30, Nov. 1987
8MB and Ports for the PS/2 Model 30

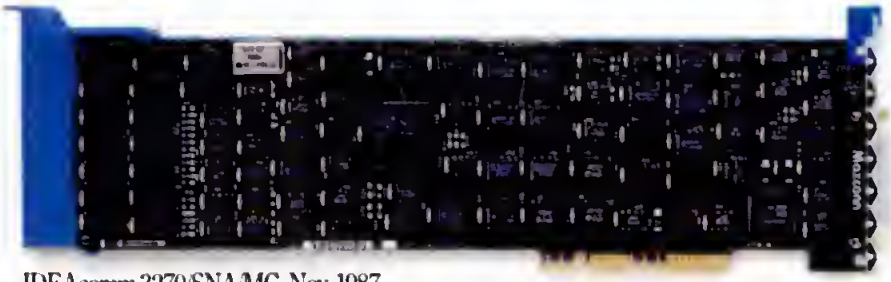
On April 2, 1987, IBM brought the world to a standstill when it brought the PS/2 to life.

Now while everyone else waited to see how this latest offspring would be accepted, we quietly set out to create products that would help the PS/2 reach its fullest potential. And two months later, we delivered.

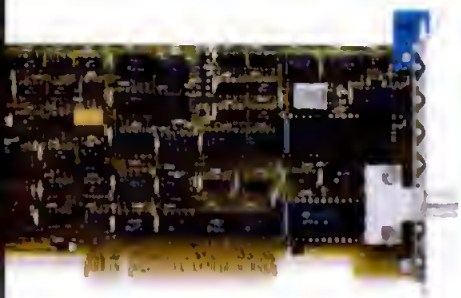
In fact, we were the first to devise completely functional local and remote links between the PS/2 and System 3X minicomputers. First to offer local and remote gateway communications for the PS/2 on a local area network. And first with a Micro Channel® board that adds up to 12 megabytes of memory.

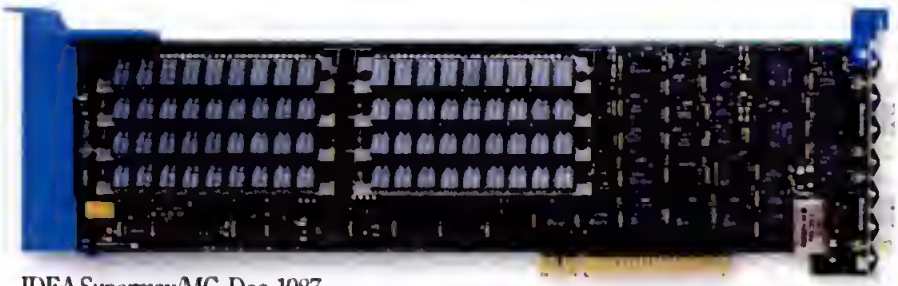
Our list of firsts didn't start with the PS/2, either. For example, we pioneered the industry standard in backplane design for multifunction boards. And we were the first to fully apply surface mount technology, which allowed us to put all the basic computing functions onto one PC board. (Interestingly enough, a year later IBM

es birth to a new PC, to send out cards.

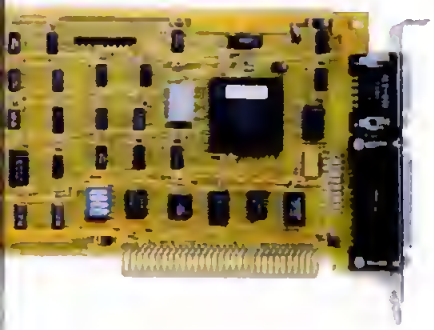


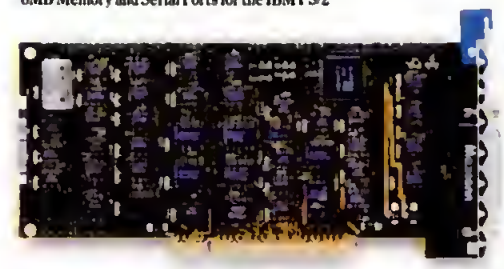
IDEAcomm 3270/SNA/MC, Nov. 1987
Remote Mainframe Communications for the IBM PS/2



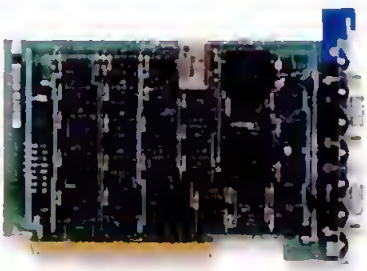


IDEA Supermax/MC, Dec. 1987
8MB Memory and Serial Ports for the IBM PS/2





IDEAcomm 5250/Remote Gateway/MC, Dec. 1987
PS/2 Remote Gateway to the IBM System 3X



IDEAmini/MC, May 1988
I/O Card for the IBM PS/2

used surface mount technology to create the PS/2.)

The ability to conceive products quickly stems from our corporate commitment. Since our inception in 1982, our goal has been to do more than enhance IBM's personal computers. It's been to truly advance them. Our in-house research and development team meets this goal so well, it continually develops PC enhancement products before IBM does.

We're IDEA. And if you want to find out what's really happening with IBM's personal computers, call us at 1-800-257-5027. We'll be the first to tell you.

IDEAssociates™
The Leader in PC Technology.

IDEAssociates, Inc., 29 Dunham Road, Billerica, MA 01821, (617) 663-6878, Telex 4979780; France, Hong Kong, Germany, United Kingdom.
The IDEA, IDEAcomm, Supermax and IDEAmax trademarks are registered in the U.S. Patent and Trademark Office by IDEAssociates, Inc. IDEAmini is a trademark of IDEAssociates, Inc. IBM and Micro Channel are registered trademarks of International Business Machines Corporation. PS/2 is a trademark of International Business Machines Corporation.

CIRCLE 265 ON READER SERVICE CARD

Most *Boyan* commands are easy-to-remember mnemonic Alt-key combinations, like Alt-D to dial and Alt-H to hang up. In fact, *Boyan*'s user interface was strongly influenced by the *PC-Talk/Qmodem/ProComm* school of communications program design; users familiar with those programs should have little trouble with *Boyan*.

You make some trade-offs when you buy software for $35. With *Boyan*, the trade-off is support; there's no staff to answer calls. Boyan himself and other users polled over a bulletin board will be your primary support. Of course, *Boyan*'s ease of use mitigates this trade-off.

DIALING The dialing directory holds up to 200 phone numbers, each of which can call a script file to automate the log-in process. While you can sort the directory according to name, you have to specify the number (1 to 200) for the computer you want to call. As you might expect from shareware, *Boyan* includes predefined log-in scripts for RBBS, PC-Board, and other BBS systems but not for commercial services like CompuServe and MCI Mail.

If a number *Boyan* dials is busy, *Boyan* throws it on the redial queue. If you regularly check in to several services, you could log in to the available ones, with the busy numbers on the queue waiting to be redialed. When you activate redialing, *Boyan* calls each number on the queue in turn until it has made all the connections. When it makes a connection, *Boyan* beeps loudly to call you back to the computer.

NEAT TRICK To download a file, you just press PgDn. Since *Boyan* scans the screen buffer for the name of the file you're downloading, you don't have to reenter the filename—a neat little trick that other programs should adopt.

Boyan supports the Xmodem, Xmodem-CRC with fallback, Ymodem (Xmodem-1K), and Ymodem-G (streaming Xmodem-1K) protocols. It can also use external protocol programs, like DSZ for Zmodem or PC-Kermit for *Kermit*, to upload and download files using those protocols. *Boyan* was one of the better performers on the PC Labs performance tests for Xmodem transfers.

Boyan has powerful script and macro languages. Most of what other communications programs store as simple strings *Boyan* stores as a macro. This feature enables you to build fancy macros to accommodate unusual modems and phone systems. The more than 100 macro commands enable you to do almost anything you can do from the keyboard.

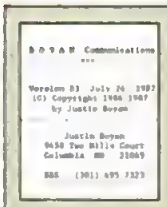
To *Boyan* a macro is a one-line program, and a script is just a file of macros strung together. Scripts can include branches to labels. Macros are recursive. Unlike *Crosstalk Mk.4*'s CASL and *Smartcom III*'s Scope, *Boyan*'s terse script language lacks support for general-purpose programming, but it handles basic communications tasks easily and well.

Boyan's "scrollback buffer" makes your on-line life easier by saving data that scrolls off the top of the screen. Other nifty *Boyan* features include its DOS file manager and its Gossip mode, which divides the screen into separate windows for incoming and outgoing data, making it easier to hold a "conversation" on-line. And *Boyan*'s wonderful "backspace editor" steals from the screen buffer the line you were typing on-line and lets you edit it.

But *Boyan* is not perfect. It doesn't support multiple sessions, terminal emulation, or remote operation. The generally good manual, while including both an index and table of contents, could use additional and more-complex examples of scripts, and a better explanation of the script language.

Still, *Boyan* is pretty impressive. Yes, it has more than a passing resemblance to Datastorm's *ProComm* shareware program, which has features, such as terminal emulation, that *Boyan* lacks. But *Boyan* is easy on you as well as your budget, and in the tough world of communications, that kind of comfort counts.—**Howard Marks**

PC MAGAZINE FACT FILE



***Boyan*, Version D3**
Boyan Communications
9458 Two Hills Ct.
Columbia, MD 21045
(919) 682-4225 (BBS)
List Price: $35
Requires: 256K RAM, DOS 2.1 or later.
In Short: A shareware product similar to *ProComm* with surprisingly powerful script and macro languages. Does not support remote operation or multiple sessions, however. Not copy protected.

CIRCLE **680** ON READER SERVICE CARD

Crosstalk Mk.4

Crosstalk Mk4 is the powerful successor to *Crosstalk XVI*, but the relationship between the two does not extend far beyond their names. Priced at $245, DCA/Crosstalk Communications' *Crosstalk Mk4* is targeted at sophisticated communications users who require multiple communications sessions using combinations of modems, direct connections, and other devices. Its programming language, CASL (Crosstalk Application Script Language), also makes *Crosstalk Mk4* appealing to power users.

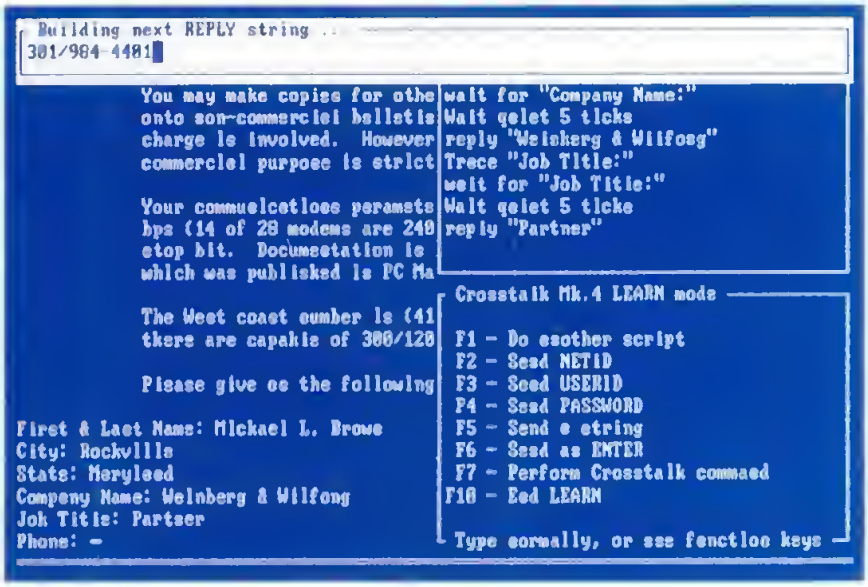
Crosstalk Mk4's user interface and clean, uncluttered screen are vastly different from what you'll find in *Crosstalk XVI*. If the communications parameters require some alteration, you can call them up through menus or by using an Alt-key combination.

Crosstalk Mk4 comes on two disks. Its manual leaves a bit to be desired. Installation instructions say to place the disk marked Crosstalk Program Disk in drive

PC MAGAZINE FACT FILE

***Crosstalk Mk.4*, Version t.0t**
Digital Communications Associates Inc.
Crosstalk Communications Division
1000 Holcomb Woods Pkwy.
Roswell, GA 30076
(800) 241-6393
(404) 998-3998
List Price: $245
Requires: 256K RAM, DOS 2.0 or later.
In Short: A high-powered program that has excellent file-transfer protocols and a powerful programming language. Allows up to 15 concurrent communications sessions. Not copy protected.

CIRCLE **679** ON READER SERVICE CARD



Although Crosstalk Mk.4 *is targeted for users who require multiple communications sessions using combinations of devices, the program includes an easy-to-use learn mode that enables creation of scripts for often-used communications services.*

A:, but neither disk is so marked, and menus are identified by inexact names. Support is not toll-free, and the number is often busy, but the technical service is excellent once you reach it. On-line help is available, but not when you are running a script file.

■ *Crosstalk Mk.4*'s power becomes evident when using the X.PC modem driver, which can handle up to 15 communications sessions on a single modem.

Crosstalk Mk4 contains 29 prewritten scripts and includes an easy-to-use learn mode, which you invoke by typing Do Learn at the command line. *Crosstalk Mk.4* builds the script file, and you can edit other enhancements into it or even write a script to invoke one of the prewritten scripts.

DAZZLING DISPLAYS The CASL script language borrows from Pascal and BASIC. Scripts can reference line numbers or labels and use English-like commands and statements. The scripts you create with CASL can handle multiple communications sessions and dazzling screen displays that include such features as painted windows.

Crosstalk Mk4's power becomes evident when using the X.PC modem driver, which can handle up to 15 communications sessions on a single modem. You can even create a rudimentary BBS. But once compiled, *Crosstalk Mk4* does not allow a script to be decompiled. If *Crosstalk Mk4* encounters a compiled script with a date and time earlier than a source script, it assumes changes have been made and will recompile the script. If an error is encountered during the compilation, *Crosstalk Mk4* describes the error; gives you the name of the script, the line number, and the actual line; and lets you edit the line before continuing compilation.

Crosstalk Mk4's DART file-transfer

We have one thing to say to the people who keep getting personal about PROCOMM PLUS.

"Right now, PROCOMM PLUS is the definitive telecom program and the one I personally use and recommend."
John C. Dvorak, columnist, PC Magazine

People who review software have a very tough job. They see hundreds of new programs every week. But the ones who have seen the new PROCOMM PLUS communications software are doing more than writing rave reviews about it. They're getting personal. They're using it at work and at home.

Maybe it's because PROCOMM PLUS is so easy to use it's "intuitive." Or perhaps it's because PROCOMM PLUS has an extremely powerful script command language, context sensitive help, 16 terminal emulations with keyboard re-mapping, 12 file transfer protocols, a fully-automated dialing directory, and advanced host mode with electronic mail.

But one thing is for certain. If PROCOMM PLUS is the personal choice of the people who review software, you can be sure that PROCOMM PLUS is right for you.

It's time you got personal about PROCOMM PLUS. Ask for PROCOMM PLUS at a dealer near you. Or, call 314-474-8461.

Thank You.

CIRCLE 504 ON READER SERVICE CARD

Communications Software: Summary of Features

(Products listed in ascending price order)

PROGRAM DESIGN	Boyan $35.00	Ptel $49.00	ProComm $50.00	Qmodem $50.00	BitCom $69.00	Mirror II $69.95	ProComm Plus $75.00	MEX-PC $99.95	SideTalk $119.95
Command strategy	Alt-key combinations	Command line	Alt/Ctrl-key combinations	Alt-key combinations, command line, menus	Menus	Command line	Alt/Ctrl-key combinations, *Lotus 1-2-3*–style menus	Alt-key combinations, command line, function keys, menus, point-and-shoot commands	Alt-key combinations, command line, function keys, menus, point-and-shoot commands
DOS functions included	●	●	●	●	○	●	●	●	●
Exits to DOS on local machine without breaking communications	●	●	●	●	●	●	●	●	● (in background only)
Built-in text editor	○	○	○	○	○	●	●	○	○
On-line help	●	●	●	●	●	●	●	●	●
MODEM SUPPORT									
Transmission-rate settings (bps)	300–9,600	300–9,600	300–19,200	300–38,400	110–19,200	50–115,200	300–115,200	110–115,200	110–57,600
Standard AT command set	●	●	●	●	●	●	●	●	●
Hayes extended command set	●	●	○	●	●	●	●	○	○
Other	User-definable	None	User-definable	None	None	PCjr, Racal-Vadic, user-definable	User-definable	Racal-Vadic	None
REMOTE OPERATIONS CAPABILITIES									
Remote operations via the communications software	○	●	●	●	●	●	●	●	●
Access to DOS level on host machine	○	○	●	●	○	○	●	●	●
Runs programs remotely	○	○	●	●	○	○	●	●	●
Remote file transfer	○	●	●	●	●	●	●	●	●
Password protection for remote file transfer	○	○	●	●	●	●	●	●	●
ADDITIONAL FEATURES									
Single password	○	○	●	●	●	●	○	●	○
Different passwords for different users	○	○	○	○	●	●	●	○	●
Background file transfer	○	○	○	○	○	●	● (with *Windows*, *DESQview*, or *TopView*)	○	●
Simultaneous two-way transfer	○	○	○	○	○	○	○	○	○
Max. no. of retry settings	Unlimited	Unlimited	10	N/A	Unlimited	Defined by protocol	15	Defined by protocol	N/A
Memory-resident mode	○	○	○	○	○	○	○	○	●
Macros	○	○	○	●	●	●	●	●	●
Script-language learn mode	○	○	○	○	○	●	●	○	○
User-defined menus	○	○	●	●	○	○	●	●	●
No. of terminal emulation modes	1	2	8	4	2	11	16	10	Unlimited (customizable)

—Indicates Editor's Choice ●—Yes ○—No N/A—Not applicable this feature is not available

Respond/ Async $129.00	Professional-YAM $139.00	Freeway Advanced $139.95	HyperAccess $149.00	Relay Silver $150.00	Ascom IV $195.00	Crosstalk XVI $195.00	Lync $195.00	Softerm $195.00	Crosstalk Mk.4 $245.00	Smartcom III $249.00	Relay Gold $250.00
Menus	Command line, Ctrl-key combinations, function keys	Command line, menus, point-and-shoot commands	Function keys, menus	Alt/Ctrl-key combinations, function keys, menus, point-and-shoot commands	Command line, function keys, menus	Command line, function keys, menus	Command line	Alt-key combinations, menus	Alt-key combinations, command line, function keys, menus	Menus	Alt/Ctrl-key combinations, function keys, menus, point-and-shoot commands
○	●	○	●	●	●	●	●	●	●	●	●
●	●	●	●	●	○	●	○	●	●	●	●
●	●	●	○	●	●	○	○	●	●	●	●
●	●	●	○	●	●	●	●	○	●	●	●
100–19,200	50–57,600	75–115,200	50–57,600	50–19,200	50–19,200	75–115,200	300–9,600	50–19,200	Modem-dependent	100–115,200	50–19,200
●	●	●	●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●	●	●	●
None	Trailblazer, Fastcomm	User-definable	IBM PC Convertible, Trailblazer, Microcom, CDS, Multitech, assorted MNP modems	AT&T, EVA UPTA-96, Penril, Racal-Vadic, Rixon, Trailblazer, Telenetics, user-definable	None	User-definable	None	AT&T, UDS, and 28 others	AT&T, Bizcomp, CDS, DCA, Racal-Vadic, Rixon, user-definable	None	AT&T, EVA UPTA-96, Penril, Racal-Vadic, Rixon, Trailblazer, Telenetics, user-definable
●	●	○	●	●	●	●	●	○	●	●	●
●	●	○	●	●	○	○	●	○	●	●	●
●	●	○	●	○	○	○	●	○	○	○	○
●	●	●	●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●	●	●	●
○	○	○	○	●	○	○	○	●	○	●	●
○	○	○	○	●	○	○	○	●	○	●	●
10	Defined by protocol	1	Defined by protocol	65,535	65,535	10	N/A	255	N/A	1,000	65,535
○	○	○	●	●	○	○	●	●	○	●	●
●	●	●	●	●	●	●	○	●	●	●	●
○	●	●	●	●	○	○	○	●	●	●	●
●	●	○	●	●	●	○	○	●	●	●	●
4	11	3	10	5	8	9	None	44	18	3	6

Communications Software: File-Transfer Protocols

(Products listed in alphabetical order)

	Ascom IV	BNCom	Boyan	Crosstalk XVI	Crosstalk Mk.4	Freeway Advanced	HyperAccess	Lynx	MEX-PC	Mirror II	ProComm	ProComm Plus	Professional-YAM	Pvid	Qmodem	Relay Gold
CompuServe-A	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○
CompuServe-B	○	○	○	○	●	●	○	○	○	○	●	●	○	○	○	○
CompuServe Quick-B	○	○	○	○	●	○	○	○	○	○	○	●	●	○	○	○
Crosstalk	○	○	○	●	●	○	○	○	○	●	○	○	○	○	○	○
Hayes	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○
Imodem	○	○	○	○	○	○	○	○	○	○	○	●	○	○	●	○
Kermit	○	●	●	●	●	●	●	○	●	●	●	●	●	●	●	●
Megalink	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○
Modem7 batch	○	○	○	○	○	○	○	○	●	●	●	●	●*	●	○	○
Proprietary	●	○	○	○	●	●	●	●	○	○	○	○	○	○	○	●
Relaxed Xmodem	○	○	●	○	○	○	○	○	○	○	○	○	○	○	●	○
Sealink	○	○	●	○	○	○	○	○	○	○	○	●	●	○	○	○
Streaming Xmodem 1K	○	○	●	○	○	○	○	○	○	○	○	●	○	○	○	○
Telink	○	○	○	○	○	○	○	○	○	○	●	●	●*	●	○	○
WXmodem	○	○	○	○	○	○	○	○	○	○	●	●	●	○	●	○
Xmodem (checksum)	●	●	●	●	●	○	○	●	●	●	○	○	○	●	●	●
Xmodem 1K	●	●	●	○	●	●	○	○	●	○	●	●	●	○	●	○
Xmodem-CRC	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●
Xmodem-CRC with fallback	●	●	●	○	●	●	●	○	●	●	●	●	●	●	●	○
Xmodem OverThruster	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	○
X.PC	○	○	○	○	●	○	○	○	○	○	○	○	○	○	○	○
Ymodem batch	●	●	○	○	●	●	○	○	●	●	●	●	●*	○	●	○
Ymodem-G	○	○	○	○	●	○	○	○	○	●	○	●	●	○	●	○
Zmodem	○	○	●	○	○	○	○	○	○	○	○	○	●**	○	●	○

★—Indicates Editor's Choice ●—Yes ○—No

*Professional-YAM offers three versions of each of these protocols

**Professional-YAM offers five versions of this protocol.

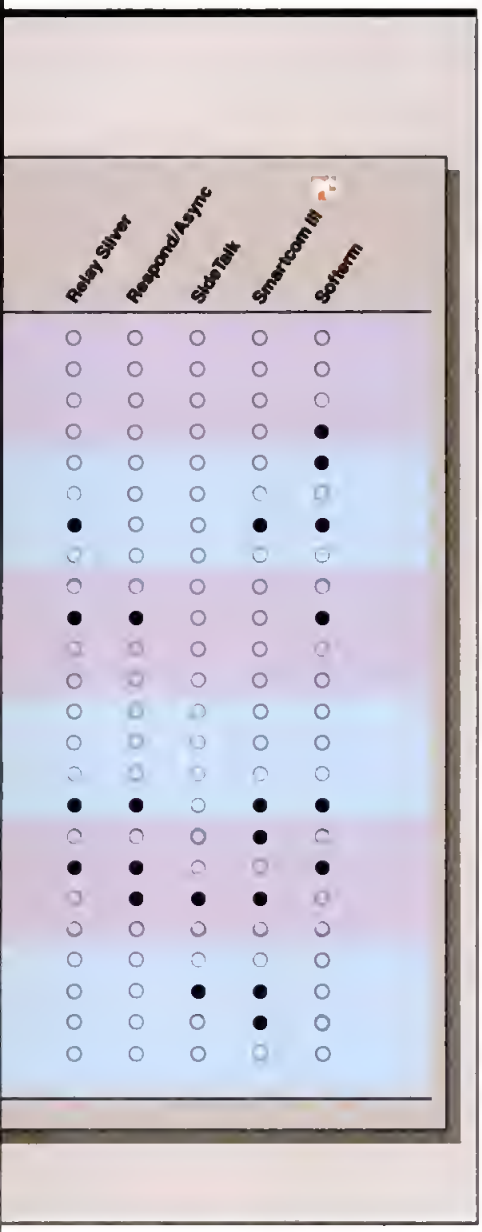
protocol comes in handy if the communications link is disconnected during a file transfer. If you later connect and redo the transfer, DART picks up where it left off. This is especially beneficial when transferring very large files.

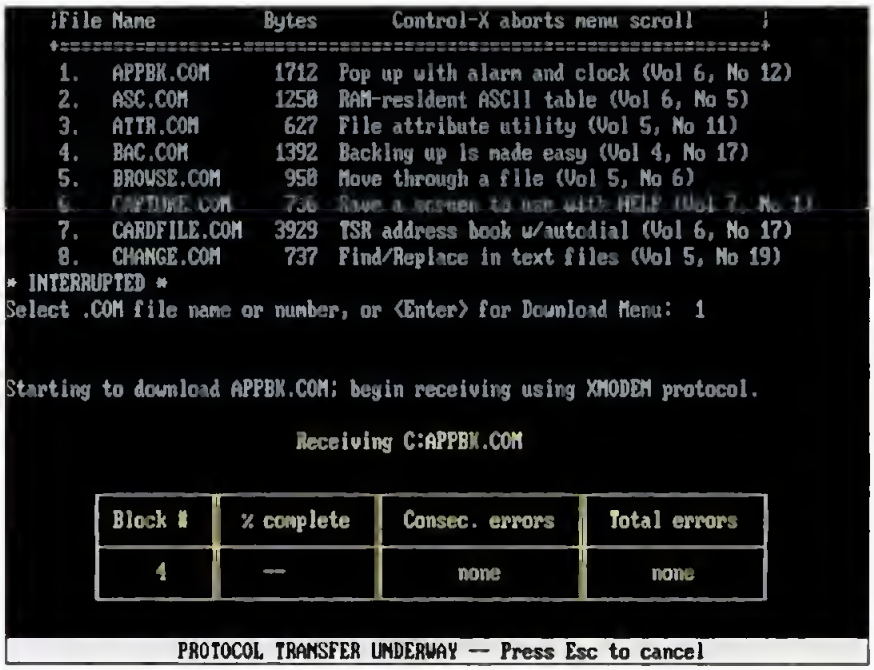
Crosstalk Mk.4 is a powerful but challenging program. If you want CASL and plan to transfer large files, it is a very attractive program. But if ease of use is a concern, you might want to investigate other packages.—**Michael Brown**

Crosstalk XVI

Although *Crosstalk XVI* hasn't been updated in over a year, it is certainly not an orphan program. It is still being actively marketed by DCA/Crosstalk Communications, and there is no hint that support for the $195 package will wane. However, with the birth of the new, improved *Crosstalk Mk.4*, *Crosstalk XVI* may find itself quickly assuming the status of an unwanted stepchild.

Crosstalk XVI has always had an interesting place in the communications market. Users who want to get a taste of programming usually find *Crosstalk XVI*, with its straightforward script language, a good place to start. And if you'd rather not deal with a programming language, the product will shield you from what is going on behind the scenes. But those who use more-sophisticated applications that demand a complex language structure will want to look elsewhere.





Crosstalk XVI *constantly displays the status of a file being downloaded using the Xmodem protocol, along with any transmission errors that may occur. The Esc key is always used either to stop a process or ta taggle to and from the command line.*

SCRIPTED OPERATIONS *Crosstalk XVI* operates through a series of scripted operations that are accessed through two file types: command files, which have the suffix .XTK, and script files, which end in .XTS. The former contain all the parameters necessary for making a call, such as the phone number and bit-per-second rate. More-complex operations are governed by the script file, which is invoked automatically whenever a command file of the same name is used.

The first time *Crosstalk XVI* is called up, it automatically runs through a script that takes care of default system parameters. Users of such well-known systems as The Source and MCI Mail can also add phone numbers and passwords through an automated sequence that drops the appropriate phone numbers and passwords into their proper places in the script files.

These files, and all other *Crosstalk* functions, are called up from the main status screen. Most features that may need to be changed by the user, such as the phone number, bps rate, and so on, are in view here, along with their current status. Commands are typed in at the bottom of the screen, using either the first two letters of the word or the entire word itself; and you will be prompted by the program if you have not fully completed the command. For example, NU 1-212-555-1212 will change the number to be dialed; if you simply type NU or NUMBER on the command line, the program will ask you for the number you wish to dial.

Once you make a call, you are automatically placed in the terminal screen, where all on-line communications take place. The Esc and Home keys toggle back and forth to the command line and the status screen, respectively.

For anything more sophisticated than a

FACT FILE

***Crosstalk XVI*, Version 3.61**
Digital Communications Associates Inc.
Crosstalk Communications Division
1000 Holcomb Woods Pkwy.
Roswell, GA 30076
(800) 241-6393
(404) 998-3998
List Price: $195
Requires: 128K RAM, DOS 2.0 or later.
In Short: This old favorite has a flexible script language and is also relatively easy for newcomers to handle; however, it is not suitable for more-sophisticated applications. Not copy protected.

CIRCLE 678 ON READER SERVICE CARD

INTRODUCING SOMETHING YOU'VE ALWAYS WANTED IN YOUR COMMUNICATIONS SOFTWARE.

EVERYTHING.

NEW RELAY GOLD 3.0

RELAY Communications announces the most comprehensive PC-to-PC and PC-to-mainframe communications software program ever. New RELAY Gold® Version 3.0.

When Jim Seymour described RELAY Gold in PC Week (September, 1986) he said it was "probably the fastest and classiest communications program ever written . . ." And now, RELAY Gold is even faster. In fact, with the addition of CommPressor™ data compression, file transfer will be up to three times faster allowing more work to be accomplished in less time.

When InfoWorld gave RELAY Gold four disks in their January, 1986 review they called it ". . . a program that will fill the needs of the novice telecommunications user and yet keep up as your level of sophistication grows." Today RELAY Gold is even more flexible to help corporations standardize on one communications solution: Unparalleled mainframe connectivity. New terminal emulation compatibility. And a network version that lets you save on equipment costs by sharing modems.

When PC Magazine named RELAY Gold Editor's Choice in May of 1987, it said "RELAY Gold's [script] language is among the most sophisticated of any communications program." And now our script language is even more powerful. It allows scripting of simple or complicated procedures so a single keystroke can perform entire tasks — it will even write your scripts for you.

When you want one communications program that gives total software 3270 emulation; error-free transfer of any file with a mainframe; a standard interface whether you're connecting through protocol converters, 3270 emulation boards or normal phone lines; background capabilities so you can get other work done while you transfer files and a whole lot more, just ask for RELAY Gold 3.0.

You'll get everything.

CIRCLE 256 ON READER SERVICE CARD

PC Magazine's Editor's Choice Award Communications Software, October, 1986 Background Communications Software, May, 1987.

See us at PC EXPO New York Booth #313

$95 TRADE-IN OFFER. SAVE $200!

Use the card on the opposite page to trade-in your communications software for RELAY Gold. For more information about RELAY products complete and return this coupon.

Name _____

Company: _____

Address _____

City _____ State _____ Zip _____

Send to: RELAY Communications Inc.
41 Kenosia Avenue Danbury, CT 06810.

RELAY COMMUNICATIONS INC.

1-800-84-RELAY (In CT 203-798-3800)
In Canada 416-890-1956
The full spectrum of communications software.

simple sign-on, *Crosstalk XVI*'s language is useful. It is flexible enough to supply many of the options needed for simple business use, including the ability to wait for and reply to on-line prompts, to wait for a specified time and then run the script, to accept and process keyboard information, and to conditionally jump to other parts of the script.

SCRIPT TRICKS Novice programmers will find that there are advantages to dealing with a program that has been around as long as *Crosstalk XVI*. Because of its popularity, there are quite a few script tricks (unfortunately not mentioned in the manual) circulating around the user network. For example, *Crosstalk XVI* by itself has no function to allow you to operate your computer remotely outside of a few simple communications features. (In fact, the XDOS command, which exits the program, can be accessed when you are talking remotely with the computer—with the result that you place your remote computer in DOS and out of contact.) However, you can persuade the program to do so using a short batch file, which was recommended to me by a *Crosstalk* technician (for more information, see Power User, *PC Magazine*, October 27, 1987).

It would have been helpful if DCA had included some of these tips in the manual, which, like the program, has not been updated for some time. However, the technical support staff at DCA is knowledgeable and helpful; in addition, there is now a *Crosstalk* SIG on CompuServe that users who have questions can access.

Unfortunately, *Crosstalk XVI*'s own help facilities leave something to be desired. There is a Help function that lists the commands available; for more information, you type Help and the command you are inquiring about. But if you are uncertain about which command will, say, let you upload using Xmodem, you will have to do a great deal of guessing.

You will find many users who still swear by *Crosstalk XVI*, and if you're looking to purchase a communications program for the first time—or if you've got a friend who's accumulated a lot of *Crosstalk* scripts—and don't need anything particularly exotic, you may want to give this one a glance. But be warned. When I pressed DCA's technical staffers on questions about a couple of PC Labs' more-elaborate applications tests, their reply went something like this: "Well, we probably could figure something out eventually, but we'd really have to put the program through loops to get it. I'm sure that *Crosstalk Mk.4* does it, though . . . ."

—Barbara Krasnoff

Freeway Advanced

Freeway Advanced, from Kortek, brings fully functional communications to the novice. To the power user it offers a *Crosstalk*-compatible script language, a keystroke learn feature, terminal emulation (VT-100, VT-52, TTY), and support for several protocols. But somewhere in between things bog down. If you're a beginner who wants to work up to power user status, you may not find all the tools you'll need in this $139.95 package.

Getting up and running is easy. The documentation is well organized, if at times sketchy. Nevertheless, those who want to skip the basics will appreciate a section called "Three Test Drives," in which the most important parts of the program are discussed. Novices will find a useful section called "Everything You Ever Wanted to Know About Computer Communication, but Were Afraid to Ask." There are also sections on troubleshooting that outline the difficulties you might encounter and corrective actions that you can take when you do.

POINT-AND-SHOOT APPROACH *Freeway Advanced*'s menus are easy to follow and use. They employ a point-and-shoot approach that keeps keystrokes to a minimum and helps a novice stay on track. Context-sensitive help is also available. You simply type "?" to call up a clarification of a function. There is also a handy autopilot feature that "learns" steps in functions that are performed often.

Passwords can be set for a phonebook entry and its accompanying autopilot, as well as for remote access to your system. Remote-access passwords are encrypted and hidden in one of the system files.

Freeway Advanced can work at speeds up to 115,200 bits per second, and modem parameters can be set and changed at any time. The program supports the following protocols: Xmodem, Xmodem 1K, Ymodem batch, Kermit, and Crosstalk.

Freeway Advanced's *point-and-shoot menu-driven structure lets you see exactly where you are. In the above screen, the user is editing a phonebook entry.*

Freeway Advanced organizes phone numbers into nine phonebooks with 12 entries each. With each entry you can specify bps rate, parity, terminal type, and data format. You place a call by simply dialing automatically from the phonebook. You can set the number of times the system will redial, as well as the time intervals between the redials.

The chapters in *Freeway Advanced*'s manual are brief, and many features are either not covered completely or not covered at all. Complicating the situation is the fact that changes were made to the program after the documentation was published. Help is available from a Read Me file on the floppy disk, but it is a nuisance to abandon your project and repeatedly consult this file for basic information.

Freeway Advanced's greatest shortcoming, however, is its script language. The commands are listed alphabetically in the documentation, which is fine, but they are not accompanied by examples so that you can see what a script looks like. Customer support suggests that you look at the bulletin board script that is on the program disk. This is helpful to an experienced user but it does not offer much to the novice. The script language is *Crosstalk*-compatible, but few users will want to purchase *Crosstalk* to get a manual that explains how to use the script language.

—Patricia L. Becker

PC MAGAZINE FACT FILE

Freeway Advanced,
Version 2.2
Kortek Inc.
505 Hamilton Ave.
Palo Alto, CA 94301
(800) 327-0310
(415) 327-4555
List Price: $139.95

Requires: 384K RAM (640K recommended), one disk drive (hard disk recommended), DOS 2.0 or later.

In Short: An easy-to-follow menu-driven system makes this program good for beginners. Its script language is *Crosstalk* compatible, but documentation on its use is sketchy and of little value to those wanting to learn it. Not copy protected.

CIRCLE 688 ON READER SERVICE CARD

HyperAccess

Hilgraeve's $149 *HyperAccess* (IBM PC Revision 3.25) has developed into one of the finest communications packages on the market. It features high-speed file transfer, a powerful script language, an easy-to-use interface, and an interactive tutorial.

Novice users can get off to a good start by using the informative tutorial and proceeding step by step or by jumping to the chapter of their choice. Extensive sample communications sessions demonstrate every aspect of the program—from making manual data calls to using the most complicated auto-log-on scripts.

For hard disk users, installation is as easy as typing COPY. The first time you run *HyperAccess*, it automatically executes a start-up script, written in its HyperPilot script language. The program prompts you for the necessary installation parameters, then modifies your CONFIG.SYS (harmlessly) and installs a device driver.

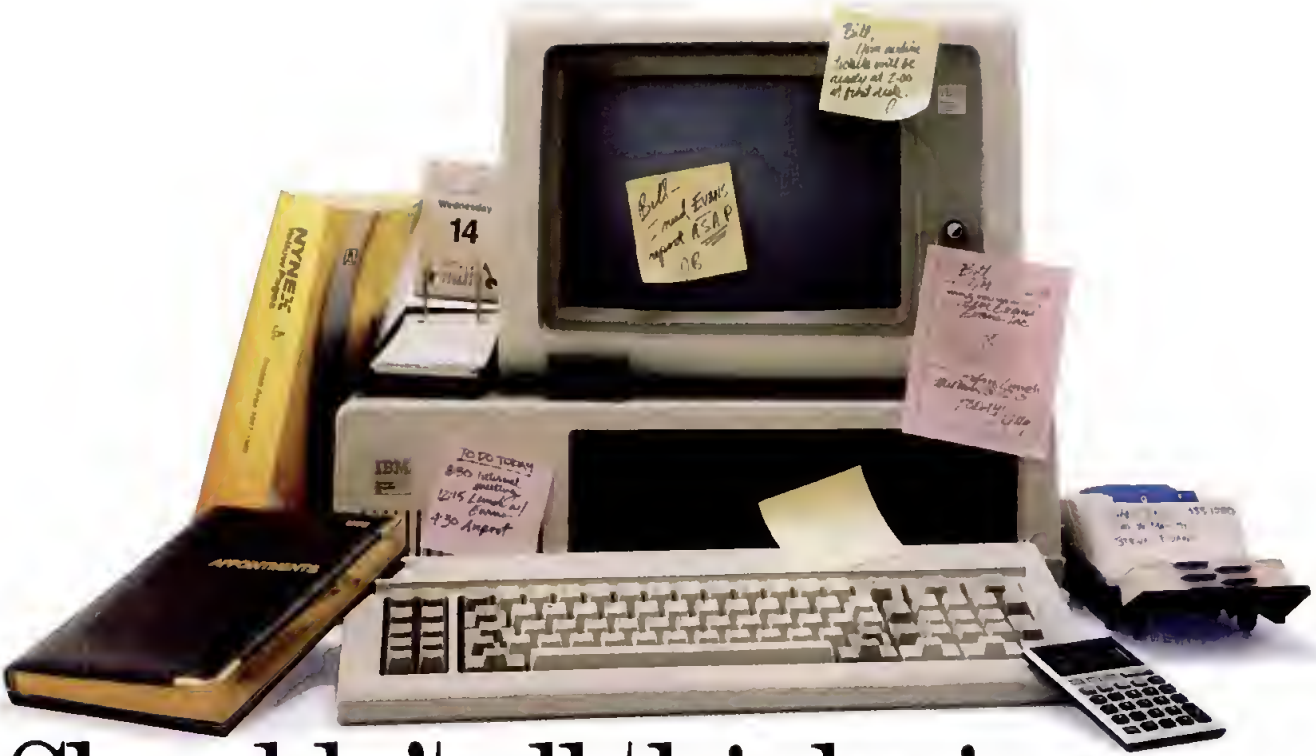
HyperAccess is compatible with TSRs like *SideKick* and multitasking programs like *DESQview*, *TopView*, *DoubleDOS*, and *Microsoft Windows*. It includes all the drivers and instructions you need to run these programs along with it.

FOLLOWING PROTOCOL *HyperAccess* performed the fastest Xmodem file transfer on PC Labs performance tests—even with its proprietary data compression scheme turned off. Its proprietary protocol, HyperProtocol, is significantly faster than most common protocols because of its streaming data flow and data compression features. HyperProtocol is a must for those who transfer files through noisy phone lines.

Without exiting from *HyperAccess*, you can execute DOS commands and other programs. Therefore, you can easily examine or manipulate files in your computer or run another program without breaking a communications link. When executing memory-hungry programs, you can save *HyperAccess* to disk to free up valuable amounts of RAM.

HyperAccess's remote-operations feature permits an authorized user to control his computer through the keyboard of a remote terminal. The host defines users' individual passwords and levels of access, and users with limited access cannot over-

Pressing F1 on HyperAccess*'s main menu invokes the program's Call screen, which displays the first eight entries in the phone list. The Hayes Smartmodem 2400 displayed in the upper right is only one of more than three dozen models chosen during the installation routine.*



Shouldn't all this be in your computer instead of on it?

Remember the early allure of PCs? How they were going to make your office work easier and your life more organized? Well, Lotus® Metro™ 1.1 delivers on that promise.

Metro is a memory resident desktop manager which runs behind application programs such as 1-2-3® and Symphony.® It's a two-for-one product combining 12 valuable accessories with a powerful macro generator.

The accessories all use the familiar Lotus interface, and include an appointment book, phone book, calculator, DOS file manager, list manager, basic word processing, notepad, clipboard, watch, among other features. The macro generator helps you simplify difficult or repetitive tasks.

If available RAM is an issue, Metro now includes "The Swapper" allowing you to run its accessories using as little as 64K of RAM. Or if need be, you can unload the whole program with a single keystroke.

Two products for the price of one.

You would have to buy both SideKick® Plus and SuperKey® to match the functionality of Metro 1.1. And Metro costs only $85.*

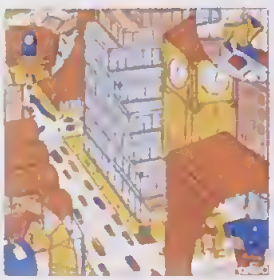
All of this makes Metro sound pretty impressive—and it is. So impressive that PC Magazine selected Metro as Editor's Choice in 1987 in the categories of Desktop Organizer and Keyboard Macros Programs.

Metro 1.1 has both 5.25" and 3.5" disk versions packaged in the same box. So visit your Lotus Authorized Dealer today, or call Lotus directly at 1-800-345-1043 and ask for product ADG-1691 to order Metro.

It's never too late for your PC to make you more organized.

Introducing Lotus Metro 1.1

Lotus Metro 1.1



System Requirements: Lotus Metro runs on IBM,® COMPAQ,® Toshiba® and other computers. For specific system compatibilities consult your Lotus Authorized Dealer. Metro requires two 5.25" double sided disk drives or one 3.5" disk drive. Hard disk not required but strongly recommended. Minimum of 64K required with Swapper, 125K without. DOS 2.1 or higher. Swapper requires a hard disk, extended RAM with VDISK, or Intel AboveBoard with Intel RAM Disk. Metro is unprotected and runs with a wide variety of software programs, including 1-2-3 and Symphony. When you purchase Lotus Metro directly from Lotus, take your first 30 days to try it. If after 30 days, Lotus Metro does not perform as described and you've purchased it directly from Lotus, we'll gladly give you a full refund.

© 1988 Lotus Development Corp. Lotus, 1-2-3, and Symphony are registered trademarks, and Lotus Metro is a trademark of Lotus Development Corp. IBM is a registered trademark of International Business Machines Corp. COMPAQ is a registered trademark of COMPAQ Computer Corp. Toshiba is a registered trademark of Toshiba Corp. SideKick and SuperKey are registered trademarks of Borland International, Inc.

*Suggested Retail Price

write or delete files on the host computer.

With *HyperAccess*, you can automate entire communications processes. *HyperAccess* can sign on to remote systems and handle routine file transfers or place calls for you in the middle of the night. To automate a process with HyperPilot, you can write a script using your favorite text editor and then have *HyperAccess* automatically compile it.

You can execute scripts with remarkable flexibility. You can run scripts directly from the DOS command line or run them from the communications screen. Finally, you can designate a script as a "sign-on" script, which the program automatically executes after a communications link has been established.

To get you started, included with *HyperAccess* are 36 useful, prewritten scripts, including log-on scripts to many popular remote systems. Other scripts place a data call at a designated time, log in to and download files from a *HyperAccess* host, and set up your system as a high-security dial-back host. What's more, *HyperAccess* can run the scripts unattended. When the program first runs an auto-log-on script, it learns your sign-on password and stores it for use in future auto-log-ons. Unfortunately, since .NIX files are unencrypted, anyone can, with the aid of a few simple DOS commands, view your passwords and thereby compromise the security of your communications.

EDITOR'S CHOICE

FACT FILE

***HyperAccess*, Version 3.25**
Hilgraeve Inc.
P.O. Box 941
Monroe, MI 48161
(800) 826-2760
(313) 243-0576
List Price: $149

Requires: 192K RAM, DOS 2.0 or later.
In Short: This full-featured communications package offers fast, reliable file transfer, a high-powered script language that is second to none, and an informative, well-organized interactive tutorial. It's a real pro with tremendous power that's also easy to harness. Not copy protected.

CIRCLE **677** ON READER SERVICE CARD

Performance Tests: Communications Software

To time data transfers from one IBM PC AT to another, PC Labs' performance tests used two different files: a 1-byte ASCII file called OVERHEAD and a 50K ASCII file called TIMING. Each IBM PC AT had the same configuration, and the same communications programs were used on both, allowing us to measure the programs' ability to send and receive data.

The files were tested using the standard Xmodem protocol, which supports checksum for error correction. All of the tested packages can use this error-correction scheme, but some use checksum only when other communicating programs request it. For these packages—*ProComm*, *ProComm Plus*, *Freeway Advanced*, and *BitCom*—CRC error correction was used instead. Although both checksum and CRC transfer data in 128-byte blocks, CRC is inherently slower because of its additional error-checking overhead.

Besides using Xmodem (the one universal option among public-domain protocols), some programs support their own proprietary protocols, which were also tested. In general, these protocols can only be used between copies of the same communications package—or different packages from the same manufacturer. In some cases, however, the proprietary protocols are licensed for use by other manufacturers. The programs we tested with their own protocols were *HyperAccess*, *Professional-YAM*, *Crosstalk XVI* and *Mk.4*, *Freeway Advanced*, *Relay Gold* and *Relay Silver*, *Ascom IV*, *Lync*, and *Softerm*. For comparison, the results of testing with the Xmodem protocol and with the proprietary protocol are shown together for both the TIMING and OVERHEAD files.

The test results for transfer of the TIMING file are representative of real situations. *HyperAccess* performed file transmissions faster than any of the other programs. Both with Xmodem and with its proprietary HyperProtocol, *HyperAccess* came in first.

Crosstalk XVI and *Mk.4* were within the top four. *Crosstalk Mk.4*, with its proprietary protocol, DART, was right behind *HyperAccess*, but *Crosstalk XVI*—using its older Crosstalk protocol—didn't fare nearly as well.

Relay Gold and *Relay Silver* were midroad for Xmodem tests and proprietary protocol tests alike. (Their proprietary protocol is called Relay Bidirectional.) The only difference between the two programs is that *Relay Gold* adds support for mainframe communications. Because the programs are identical for PC-to-PC communications, we decided to test them with *Gold* installed on one AT and *Silver* on the other.

Softerm was the slowest of the packages we tested, both with Xmodem and with a proprietary protocol (Softrans). While transferring data, the program shows the data on the screen, which significantly slows its performance for file transfer.

The results for the OVERHEAD file show the time taken to set up for file transfer and to return control to the keyboard. With Xmodem, *SideTalk*, *Freeway Advanced*, and *Respond/Async* yielded the fastest times. When using a proprietary protocol, *Freeway Advanced* was the fastest program on this test.

Crosstalk XVI and *Mk.4* were again among the top performers when using the Xmodem protocol. As in the TIMING file test, *Crosstalk Mk.4* delivered good performance using DART, while *Crosstalk XVI* was considerably slower using Crosstalk.

In this suite of tests, *HyperAccess* was a decent performer whether using its proprietary protocol or Xmodem. It takes only a moment to set itself up for file transfer, which is insignificant considering its speed in transferring files.

The PC Labs communications program performance tests transferred two files for each protocol tested. The **Overhead** file test was 1 byte long and was designed to time the program's overhead in setting up for transfer and in returning control to the keyboard after transfer was complete. The **Timing** file test was a 50,000-byte text file designed to measure real-case file-transfer speed.

For an across-the-board comparison of file-transfer times, we used the standard Xmodem protocol, with 128-byte blocks and checksum error checking, except in cases where checksum is not available unless another program requests it. In these cases, CRC was used.

For those programs with proprietary file-transfer protocols, we also tested the proprietary protocol. If there was more than one, we tested the fastest protocol (based on manufacturers' claims) designed for use with modems that do not have their own built-in error-correcting feature.

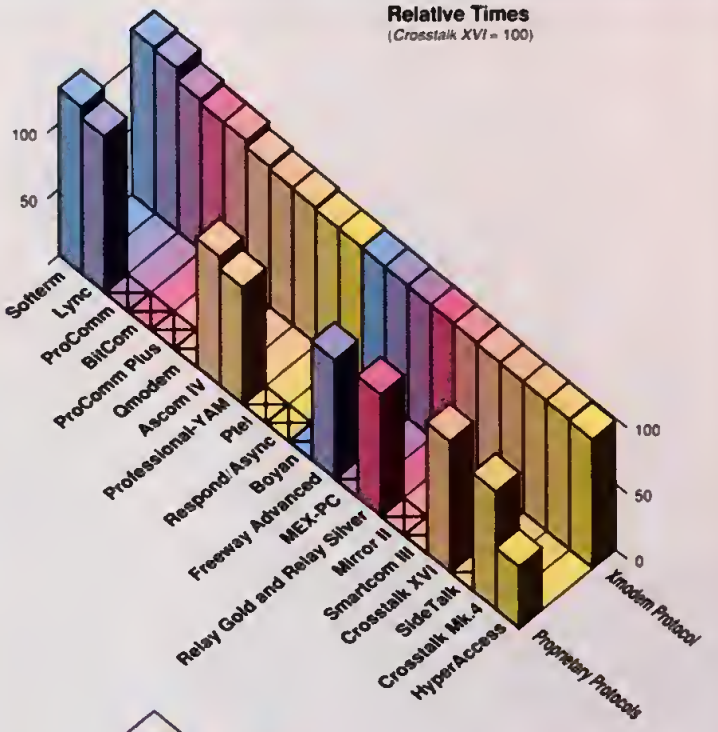
Data compression, when available, was turned off for the Xmodem tests; this ensured that file-transfer time would reflect the speed of both the sending and receiving portions of each program. For proprietary protocols, however, we used data compression, since for these there was no other option.

All the file transfers were measured from the last keystroke command on the controlling side to the moment when control was returned to the keyboard. For Xmodem transfers, this meant setting up both sides individually, then entering the command to start sending on the sending side, followed by the command to start receiving on the receiving side. For proprietary protocols, this often meant setting up one side for remote operation, then controlling the transfer from the other keyboard.

TIMING

Performance Timea (Times given in seconds)	Proprietary Protocola	Xmodem Protocol
Softerm	301	306
Lync	281	301
ProComm	N/A	277
BitCom	N/A	270
ProComm Plua	N/A	270
Qmodem	N/A	257
Aacom IV	233	252
Profesaional-YAM	212	251
Ptel	N/A	247
Respond/Async	N/A	247
Boyan	N/A	246
Freeway Advanced	216	246
MEX-PC	N/A	245
Relay Gold and Relay Silver	221	245
Mirror II	N/A	244
Smartcom III	N/A	242
Croastalk XVI	237	241
SideTalk	N/A	241
Crosstalk Mk.4	214	240
HyperAcceas	112	237

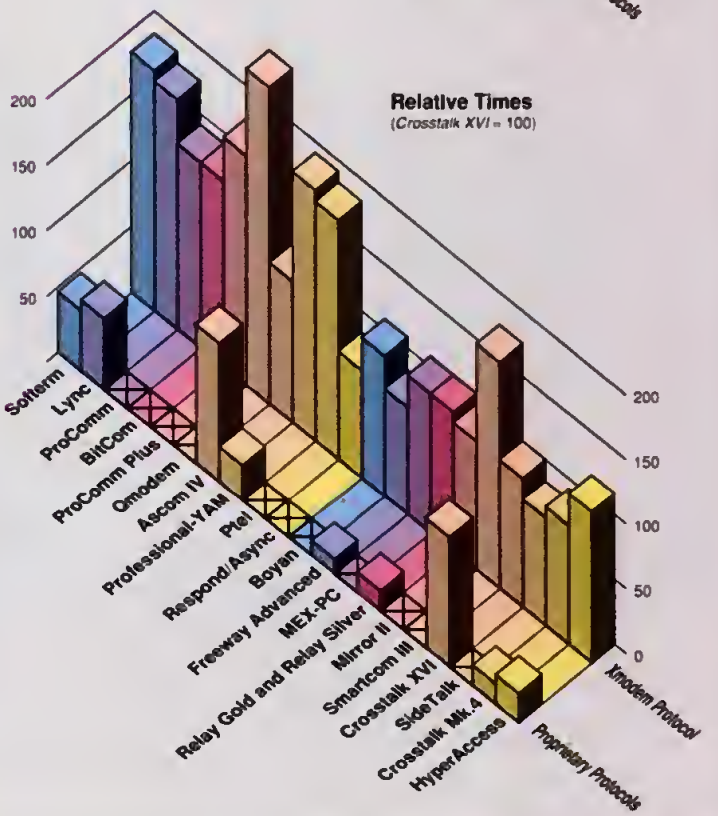
N/A—Not applicable the software offers no proprietary protocol



OVERHEAD

Performance Timea (Times given in seconds)	Proprietary Protocola	Xmodem Protocol
Softerm	4.10	2.20
Lync	4.80	2.10
ProComm	N/A	1.70
BitCom	N/A	1.70
ProComm Plua	N/A	2.10
Qmodem	N/A	2.90
Ascom IV	9.40	1.30
Profesaional-YAM	2 40	2.30
Ptel	N/A	2.20
Respond/Async	N/A	1.00
Boyan	N/A	1.30
Freeway Advanced	1.00	1.00
MEX-PC	N/A	1.30
Relay Gold and Relay Silver	1.40	1.30
Mirror II	N/A	1.20
Smartcom III	N/A	2.10
Croastalk XVI	8.80	1.20
SideTalk	N/A	1.00
Crosstalk Mk.4	1.40	1.10
HyperAccesa	2.00	1.40

N/A—Not applicable the software offers no proprietary protocol



If the world had one computer communications

The fact is, today's bewildering variety of computers demands a program like this.

CROSSTALK® Mk. 4 is the entirely new generation of PC communications software.

Its language, CASL,™ is designed specifically for the needs of communications and related applications.

- It helps your PC perform a variety of functions with a variety of different devices — direct-connection, modem, coax, or X.PC — up to 15 sessions at a time, if you like.
- It emulates virtually all popular terminals — IBM, DEC, Data General, TeleVideo, ADDS Viewpoint, and many more.
- It supports most popular modems.
- It supports the most widely used file transfer protocols, including XMODEM, YMODEM, KERMIT, CompuServe "B", CROSSTALK, and its own high-speed DART.
- It works with interfaces such as IRMA™ and Smart Alec™ to

standard you wouldn't need Crosstalk Mk.4

facilitate connections with mainframes and minis.

- Its language allows an unprecedented degree of automation of complex applications functions and contingencies.

It does everything you always wished your old communications program could do.

Maybe the world's computers can't be alike. But now at least they can communicate.

See your dealer for CROSSTALK Mk. 4, and let your imagination fly.

CROSSTALK Mk.4

CROSSTALK COMMUNICATIONS/1000 Holcomb Woods Parkway, Roswell, Georgia 30076/(800)241-6393

A Division of Digital Communications Associates, Inc. dca

CROSSTALK is a registered trademark of Digital Communications Associates, Inc. / CASL, IRMA and Smart Alec are trademarks of Digital Communications Associates, Inc.
IBM is a registered trademark of International Business Machines Corp. / TeleVideo is a registered trademark of TeleVideo Systems, Inc.
CompuServe is a servicemark of H&R Block / X.PC is a trademark of Tymshare, Inc. CIRCLE 326 ON READER SERVICE CARD

MORE SCRIPT POWER The HyperPilot script language includes string and numeric operators, branching, subroutines, pattern matching, and lots more. It can serve seasoned programmers as well as corporate users. Scripts can be written to hide *HyperAccess* behind a customized menu system and thus give inexperienced users only the choices necessary for their specific communications needs. Hilgraeve also offers site licensing for companies that have large numbers of users.

A top-notch, comprehensive, easy-to-use communications package with fast, reliable file transfer and a powerful script language, *HyperAccess* won't let you down.—**Alan Roth and Gary Stein**

.....

Lync

Lync, from Norton-Lambert Corp., was one of the first programs to offer remote PC communications, as well as the ability to transfer various files between different operating systems. Today, 3 years after its fifth and latest major revision, the $195 program remains a portable communications package capable of communicating with minis, mainframes, on-line data and e-mail services, and other PCs.

You install and configure *Lync* by running an installation procedure. Unlike most other communications programs where you have to specify the parameters, *Lync* checks the incoming data and sets these parameters accordingly. The only communications parameter you have to be concerned with is the bit-per-second rate. *Lync* runs on more than 250 different types of computer systems, a claim few other communications packages can make.

```
   Access any command by pressing the escape key and typing the command.
   To see the On-Screen Manual, press the escape (ESC) key, when you see the
   command prompt "@:" type HELP, then press the return (cr) key.  Example:

@: HELP  (cr)

(TERM/:8)
AT Z
OK

@: coms
COMS -
Internal Commands
  SEND     SAVE     TERM     LYNC     HELP     DIR      COMS     LOG
  TYPE     CALL     DO       REMOTE   WAIT     DELL     DEFAULT  WIDTH
  DRIVE    USER     CHDIR    PASSWORD CONFIG   END      QUE      TEST

External Commands
  300      600      1200     2400     4800     9600     19200    BREAK
  MODEM    DIAL     RD       HANGUP   ORIG     ANS      QUIET    AUDIO
  RINGS

(TERM/:8)
-
```

All Lync *commands and script (Log) files are accessed from a command line prompt, invoked with the Esc key. The Coms command, shown here, displays a quick list of the commands available at any time.*

When you enter *Lync*, you are placed in terminal mode, where anything you type is sent directly to the modem. *Lync* commands are entered from a command line that you access by using the Esc key. From the terminal mode, options are many: you can communicate with any on-line data service, use one of several methods of uploading/downloading data, dial numbers from a phone list, use script (LOG) files to automate these procedures, and invoke the *Lync* mode.

The *Lync* mode is used either to transfer files with another PC running *Lync* or to establish a remote link with another PC. The *Lync* program uses a proprietary error detection and correction protocol when transferring files between PCs operating in the *Lync* mode.

Remote communications can be established with a PC running any communications program as long as it's in a TTY terminal mode. Passwords can be optionally set up to restrict access to remote machines, but neither computer can transfer files.

INSTRUCTIVE DOCUMENTATION *Lync*'s documentation contains an in-depth "How to" section, helpful to novices, which covers such items as how to automatically sign on to an e-mail service, how to send and save encrypted data, how to make a mini-to-mainframe connection, and how to connect two computers both running *Lync*. A Quick Reference section explains each *Lync* command in more detail, and the remainder of the manual contains information on the advanced features and special options.

Lync contains a script language that allows you to automate dial-up, log-on, and file-transfer procedures. Scripts, called LOG files, can be chained together using *Lync* batch files, which are very much like DOS batch files. Batch files can call *Lync* commands or several LOG files. Both batch and LOG files are executed from the *Lync* command line.

You write a script command much as you would a simple if-then statement: next to a prompt that is listed on the left side of a "marker" character. If the prompt is

PC MAGAZINE FACT FILE

***Lync*, Version 5.0**
Norton-Lambert Corp.
P.O. Box 4085
Santa Barbara, CA
93140
(805) 964-6767
List Price: $195
Requires: 64K RAM, two disk drives, DOS 2.0 or later.
In Short: Entirely command-driven, *Lync* is not for beginners, but its recursive script language makes it particularly attractive. Portability among operating systems, file encryption, and remote communications capabilities make it one to consider for demanding applications. Not copy protected.

CIRCLE 687 ON READER SERVICE CARD

Unretouched Screen Images

Buy The One On The Left And You'll Have To Put It Where The Sun Don't Shine.

The monitor on the right, however, can be placed anywhere you like. Even in direct sunlight. It's the new *Flat Technology Monitor* from Zenith Data Systems–winner of *PC Magazine's* coveted "Technical Excellence Award" in the hardware category for 1987.

You Have To See Zenith To Believe It

So clear. So precise. So lifelike. It's the only monitor with a completely flat screen. A breakthrough that has redefined monitor quality forever. Industry experts are already convinced. And once you see it in person, you'll be a believer, too.

Bigger, Brighter, Glare-Free

Our Flat Technology Monitor has an impressive 14-inch display. And even though it's bigger, it's 50% brighter than conventional CRT's and it has 70% greater contrast. So you get colors with greater depth and definition that make your reports, charts and graphs come alive like never before.

The Flat Technology Monitor is virtually glare-free. So you can work longer without the usual headaches and eyestrain. And that means greater productivity. But to get the whole picture, you have to see it with your own eyes.

Backward And Forward Compatibility

You also get full compatibility with the high resolution VGA Video generated by IBM's new PS/2® computers. And with Zenith's Z-449 or other VGA-class video cards, you can enjoy CGA, MDA, Hercules and EGA graphics as well.

Experience Zenith's Latest Technology Breakthrough

Obviously, a mere picture can't do justice to our new Flat Technology Monitor. It demands a face-to-face evaluation. For a hands-on demonstration, call today for the name of your nearest authorized Zenith Data Systems dealer–the Flat Technology Monitor is available in quantities right now.

1-800-553-0305

ZENITH | data systems

THE QUALITY GOES IN BEFORE THE NAME GOES ON®

© 1988, Zenith Data Systems

Personal System/2 and PS/2 are registered trademarks of IBM Corp

CIRCLE 337 ON READER SERVICE CARD

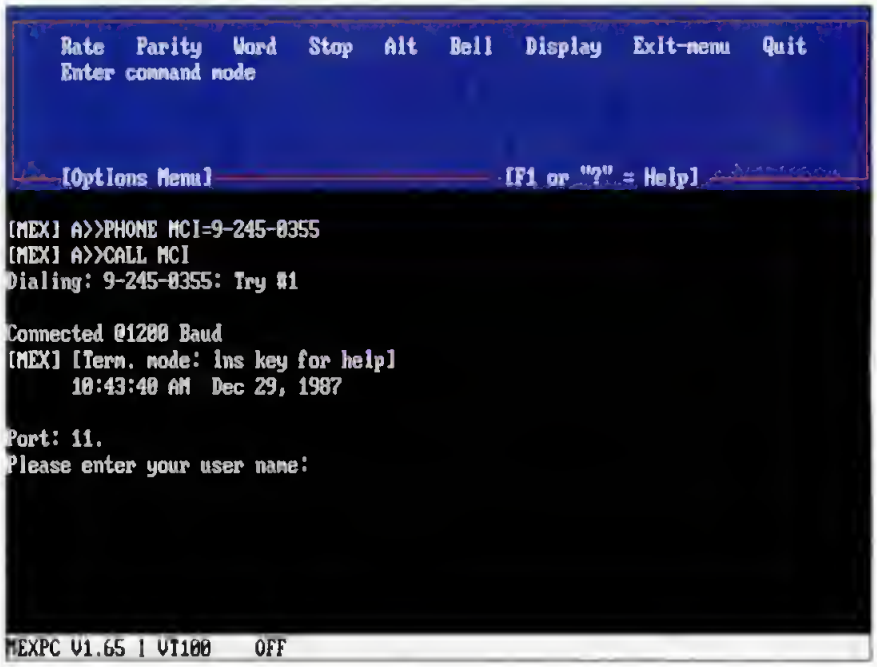
matched during communications, then the *Lync* command on the right side of the marker is executed.

If a prompt is matched out of order in a LOG file, script control will jump to the appropriate prompt and execute that *Lync* command, then jump back to where it left off. This saves you time and effort because you can include all the prompts in the LOG file that you might see, and *Lync* will match only the ones that it finds.

Lync can encrypt files for greater data security on public services. Any files that can be normally transmitted using *Lync* can be encrypted. The sender must specify a code word with the transmitted file, and only this code word can be used to decrypt the file. To encrypt spreadsheet files and other 8-bit files, you include *Lync*'s ASCII convert option to convert the file to ASCII before encryption.

Lync is not for people who rely on menus. You work from an @ sign on the screen and access the command line by pressing the Esc key. Another drawback is that it doesn't have a DOS window. However, you can execute several DOS-like commands from the command line.

Lync is available for many different types of machines and operating systems and does much of the work for you. In fact, a large number of users among the installed base use *Lync* specifically for conversions among various operating systems.—**Greg Alwang**



Once you've passed from menu to command mode, MEX-PC *becomes a much more usable system. Here, a phone number has been assigned to the phrase MCI, which was then used to call the service.*

MEX-PC

MEX-PC, $99.95 from NightOwl Software, seems tailor-made for individualists. Although it gives token help to novices with a simple menu system, *MEX-PC*'s real strength is its flexible, full-featured command language. It's a boon to anyone who prefers to program their communications packages to suit their needs.

The program's menu mode is a way for first-time users to familiarize themselves with the product. A series of point-and-shoot nested commands takes up the top fourth of the screen and opens the program. As you highlight each, an explanatory note appears below it. A tag tells you which menu you're in.

At the menu-mode level, the program allows you only to create phone number files for automatic dialing; you can save only the number and a short explanatory note. You cannot include specific parameters for the service or any log-on procedures. Once you're connected with a service, *MEX-PC* doesn't automatically switch into terminal mode. Instead, you have to toggle back to the menu and call up a separate Conversational menu, which you use to get—finally—into Terminal mode. The procedure is awkward at best.

CLONING ITSELF *MEX-PC* has no install routine. Instead, you save whatever changes you make during a particular session and copy the program. This procedure enables you to start *MEX-PC* immediately in command mode by simply cloning it while you are in that mode.

The command mode is where *MEX-PC* shows its muscle. You activate the command files by using a Do command from the command line. Within a command file, you can perform most of the functions expected of a reasonably sophisticated communications program, including unattended timed operations. You can also easily create personalized menu screens, log the date and the time as the first line of a captured file, call on subroutines, and even run other command files from within your program. The program also works well as a remote terminal.

PC MAGAZINE FACT FILE

***MEX-PC*, Version 1.65**
NightOwl Software Inc.
Route 1, Box 7, Hwy. 12
Fort Atkinson, WI 53538
(800) NITEOWL
(414) 563-4013
List Price: $99.95
Requires: 192K RAM. DOS 2.1 or later.
In Short: Although its menu mode is limited, this reasonably priced program shines in its much more wide-ranging and useful command mode, which includes a relatively sophisticated language. Beginners may find the learning curve too steep, but programmers will find the package worth serious consideration. Not copy protected.

CIRCLE 676 ON READER SERVICE CARD

Quick–turn the page.

STUDY TIME *MEX-PC*'s language is useful once you've learned it, but the manual proceeds at too leisurely a pace. It eventually explains all the commands, but a better-written tutorial would help. NightOwl Software does include several well-labeled command scripts. Unfortunately, on the whole they're too complex to be of real help to beginners. A more basic sample sign-on script would be useful.

MEX-PC has a lot to offer do-it-yourself programmers, but its menu-driven mode is weak—and its name doesn't tell the story. Hold the salsa—MEX stands for Modem Executive.—**Barbara Krasnoff**

Mirror II

When *Mirror*, from SoftKlone Distributing Corp., was first released, it was an unabashed clone of *Crosstalk XVI*—even down to the *Crosstalk* status screen. Microstuf (then the manufacturer of *Crosstalk*) cried foul and won a ruling stating that the screens were protected by copyright. SoftKlone responded by redesigning the screens. The result is *Mirror II*, a program that looks different from *Crosstalk XVI* but includes all the *Crosstalk* commands, adds significant new features and sells for just $69.95.

If *Mirror II* did no more than copy *Crosstalk XVI*, there would be little to say about it. What makes the program interesting are the differences. Consider the script language, for example. The *Mirror II* language includes all of the *Crosstalk* commands, so the program can run any script written for *Crosstalk*. It also includes enhancements. Most notably, *Mirror* adds a learn mode for automatically creating scripts. Once it is created, you can edit the script with a word processor or with *Mirror*'s own editor.

On first glance, the Mirror II *status screen bears little resemblance to the* Crosstalk XVI *screen—except for the Command? prompt on the bottom line. The parameter settings are divided into two sections, or "boxes," on the upper half of the screen.*

REDESIGNED SCREENS Ironically, *Mirror II*'s redesigned screens also offer an advantage over *Crosstalk*. The *Crosstalk* status screen has so much information that it can be overwhelming. Until you learn to ignore most of the screen, the information you really need can get lost in the crowd.

Mirror II eases the information overload. The program divides its settings into categories—including port settings, security features, connection parameters, and system settings. With three to nine settings in each category and a maximum of only two categories showing at once, the display screen is far easier to read. A simple Ctrl-key combination lets you scan through the different categories as needed.

The *Mirror II* help feature is another plus. With *Crosstalk XVI*, you can ask for information on any command, but that helps only if you already know which command you want information on. *Mirror II* adds help in finding the right command when you don't know which one you need. You can, for example, pick Binary File Transfer from the help menu, and *Mirror* will show you a list of file transfer commands along with short explanations of each. In most circumstances, this is a more useful approach.

A DRAMATIC ADDITION The most dramatic additional feature in *Mirror* is background operation. As with *Crosstalk*, you can run *Mirror II* in the foreground and clear it from memory by leaving it with the Quit command. However, you can also leave *Mirror* by way of a hotkey. This lets you load another program while *Mirror II* keeps operating in the background—redialing a busy bulletin board, automatically answering incoming calls, continuing a file transfer, or simply waiting for you to call it up again.

FACT FILE

Mirror II,
Version 3.6.12
SoftKlone Distributing Corp.
336 Office Plaza Dr.
Tallahassee, FL 32301
(800) 634-8670
(904) 878-8564

List Price: $69.95
Requires: 192K RAM, DOS 2.0 or later.
In Short: This clone of *Crosstalk XVI* offers a more readable status screen than *Crosstalk*'s, a better help system, background operation, additional file-transfer protocols, and additional terminal emulations—all at a substantially lower price. Not copy protected.

CIRCLE 675 ON READER SERVICE CARD

That's how much effort it takes to turn data into graphs with Graphwriter II.

Actually, it may take even less effort than that. You see, Lotus® Graphwriter® II is the only graphics software that lets you automatically generate large quantities of quality graphs based on current spreadsheet and database information. All with a single command.

Do you regularly need to create a variety of graphs from continually changing data such as daily inventory, monthly P&L or quarterly head count? With Graphwriter II you can create a direct link to data in your 1-2-3,® Symphony,® dBase® or ASCII files. So whenever you update your data, you can automatically update your graphs with a single command. What's more, with one keystroke you can toggle back and forth between your data source and Graphwriter II to view and select the data to be graphed. No more printing out files and time-consuming rekeying.

Graphwriter II is a full-fledged production system. You can automatically output up to one hundred charts at a time with a single command. You can even print multiple charts on a page.

And Graphwriter II offers you 24 different graph types—more than any other PC graphics package. So you can choose the chart type that best represents your data.

What's more, you have control over hundreds of style settings such as type font, heading location, bar width and color.

So if you need to create and frequently update graphs from ever-changing data, you need Lotus Graphwriter II.

To get a free self-running Graphwriter II demonstration kit, call 1-800-345-1043 and ask for demo kit AFB-2524, for 5.25″ format, or demo kit AFB-2664 for 3.5″ format.*

Then you can turn *this* page too.

Lotus Graphwriter II

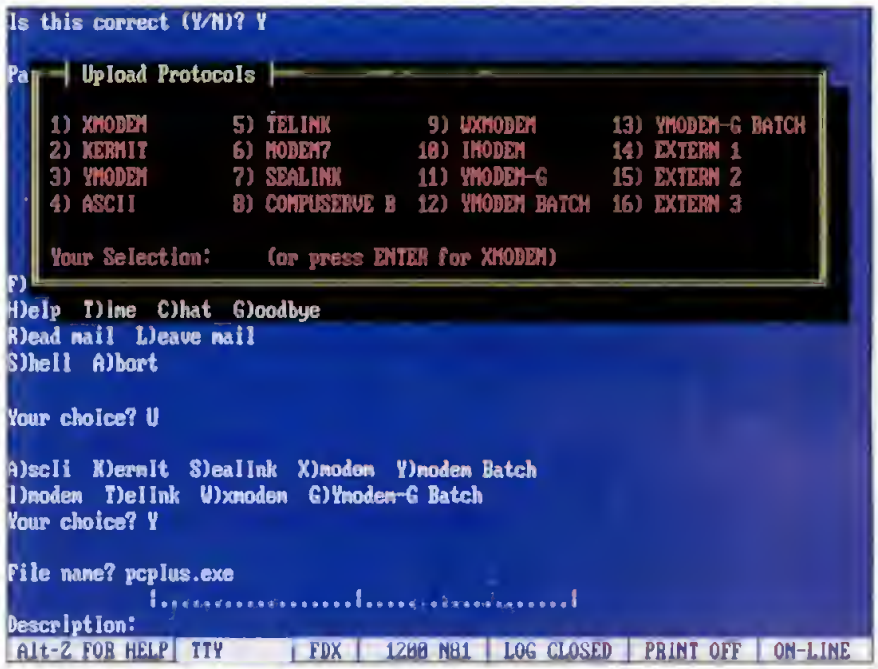
Lotus Graphwriter II

*Graphwriter II demonstration kit requires an IBM® PC or compatible, 256K and a graphics card. © 1988 Lotus Development Corporation. Lotus, 1-2-3, Graphwriter, and Symphony are registered trademarks of Lotus Development Corporation. dBase is a registered trademark of Ashton-Tate. IBM is a registered trademark of International Business Machines Corporation.

The background operation is not entirely stable. In testing for this review, the program crashed twice—both times while hot-keying out of *Mirror*. Even so, background operation is a seductive feature. Just be sure to approach it skeptically and save your work more often than usual.

Also worth noting is that *Mirror* offers 11 terminal emulations compared with *Crosstalk*'s 6. And to *Crosstalk*'s Xmodem, Kermit, and proprietary protocols, *Mirror II* adds Xmodem-CRC with fallback, Modem7 batch, Ymodem batch, Ymodem-G, and the Hayes Smartcom II protocol.

By any measure, *Mirror II* is a good value. If you're not interested in script files or background operation, there are easier programs to learn and use. But if you're serious about communications—and particularly if you're a *Crosstalk* user who has already invested time and effort in developing scripts—*Mirror II* is worth a close look. If you like *Crosstalk*, you should love *Mirror*. If you don't like *Crosstalk*, you may very well like *Mirror* anyway.
—M. David Stone



While ProComm Plus *talks to a* ProComm Plus *host, several protocol choices for file transfer appear in both the program's host menu and the exploding upload window. Note the Read Mail and Leave Mail choices; the mail feature turns* ProComm Plus *into a BBS.*

ProComm
ProComm Plus

Datastorm Technologies' *ProComm* and its new *ProComm Plus*—the first a popular $50 shareware program, and the second a $75 commercial product—are like elegantly engineered German touring cars at the price of Korean subcompacts: they'll deliver on performance, but they won't break the bank.

ProComm has been available through shareware channels for several years and stands up against the toughest competition from the commercial communications software products. *ProComm Plus* is an enhanced version of *ProComm*. It is not meant to replace the shareware version but to sell alongside it as a slightly more expensive, more feature-laden sibling.

A LOT ALIKE The two versions of *ProComm* have much in common. Either program lets you set your preferred values for most defaults. Both provide limited DOS services through file view, change directory, and directory list commands. Both versions also include a DOS shell gateway feature to let you access DOS without breaking communications. In both cases, the screens are notable for being uncluttered. And *ProComm Plus* maintains the famous *ProComm* "exploding windows," which make a chirping noise as they expand. (The feature can be turned off in both versions.)

Most differences between the versions are straightforward additions. For example, *ProComm Plus* includes its own text editor—a feature missing from *ProComm*. However, as with the shareware version, *ProComm Plus* lets you install your favorite text editor as the program's default.

The few changes in *ProComm Plus*—as opposed to additions—have all been made for a good reason. For example, the help window in *ProComm Plus* has been rearranged to make commands easier to find. Similarly, the key for calling up the help screen has been changed from Alt-F10 to Alt-Z, in recognition that IBM's new keyboard layout makes the Alt-F10 combination somewhat clumsy.

The dialing directory in *ProComm* holds 100 entries. The *ProComm Plus* directory holds 200 entries and allows multiple directories. Each entry includes a 24-character description, telephone number, communications parameters, and, optionally, the name of the script to automatically run when connection is established. The automatic redialing feature in *ProComm* has been enhanced in *ProComm Plus* to let you dial several busy numbers in a circular queue. You can direct an activity log of a communications session to a file or to your printer in either version.

UNATTENDED REMOTE FILE TRANSFER The Host mode in both versions offers a simple approach to unattended remote file transfer, complete with password protection. *ProComm* supplies one password for all users, plus a second password for access to DOS level. *ProComm Plus* lets you set up a user file, including password, user name, and privilege level (limited or complete access) for each user. Individual passwords combined with the usage log let you keep track of who is using your system. A built-in message facility turns the *ProComm Plus* Host

SKILL AND RELIABILITY

That's Made Seagate the World's Leading Supplier of 5¼" Hard Disk Drives!

40MB

The Seagate ST251-1 hard disk drive combines AT-class performance with state-of-the-art technology for proven reliability in a cost-effective hard disk drive.

- 28ms Average Access Time
- 11 Watt Power Consumption
- Free Disk Partitioning Software Included for Easy Integration
- 52,224 Bytes per Cylinder
- Standard ST412 Interface
- Auto-Park With a Balanced Positioner, Eliminating the Need for a Locking Mechanism
- Sputtered Thin-Film Media Technology
- Custom-Designed, Illustrated Documentation
- For Your AT® or Compatible
- Reliability Assured

Only. . . **$459**

80MB

For data-intensive applications, Seagate's 80MB (formatted) ST4096 hard drive delivers the reliability, dependability, and cost-effectiveness that you expect.

- 28ms Average Access Time
- 78,336 Bytes per Cylinder
- Standard ST412 Interface
- Free Disk Partitioning Software Included for Easy Integration
- Linear Voice Coil Actuator Ensures Precise Performance
- Custom-Designed, Illustrated Documentation
- For Your AT® or Compatible
- Precision Produced

Price Reduced! Only. . . **$795**

Plus. . .your bonus from CompuAdd when you buy any hard drive: **PC FullBak** *backup software, selected PC Magazine Editor's Choice among backup software May 31, 1988. "Its ease of use and low price make it an specially good value."* — **David DeJean, PC Magazine**

If you want Seagate quality in a high-capacity drive, call CompuAdd toll-free at 1-800-666-1872.

A Bit O' Bytes

20MB Seagate ST225 hard drive kit for your AT or compatible. 65ms average access time, half-height. **$249**

CompuAdd

"Personal Computer Products"

12303-G Technology Blvd. Austin, TX 78727

CIRCLE 320 ON READER SERVICE CARD

ORDER TOLL FREE:
800-666-1872
Inside USA

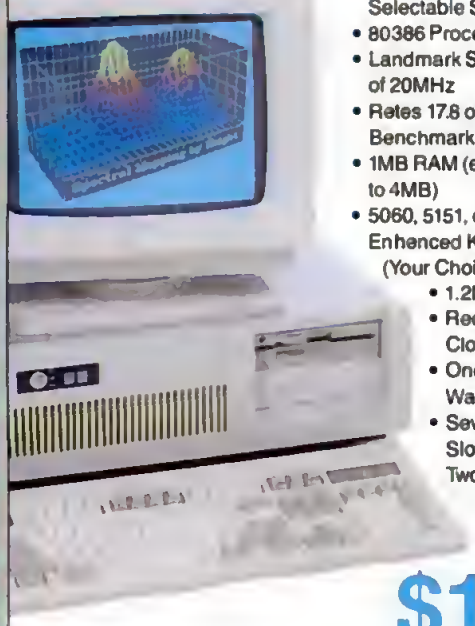
Customer Service: 800-999-9901	FAX: 512-250-5760
Telex: 763543 COMPUADD AUS	Outside USA: 512-256-5575

Convenient Sales Hours!
M-F 8 a.m. — 9 p.m. CST
Sat. 9 a.m. — 5 p.m. CST

USER-FRIENDLY

CompuAdd Computers for Compatibility, Reliability, and Easy Setup!

Standard-386/16



- 4.77, 6, 8, 16MHz Software-Selectable Speed
- 80386 Processor
- Landmark Speed Rating of 20MHz
- Retes 17.8 on Norton's SI Benchmark Test 4.0
- 1MB RAM (expandeble to 4MB)
- 5060, 5151, or 101-Key Enhenced Keyboerd (Your Choice)
- 1.2MB Floppy Drive
- Reel-Time Clock/Calandar
- One-Year Limited Warranty
- Seven Expansion Slots: Five 16-Bit & Two 8-Bit

$1995

Standard-286/10

PC MAGAZINE **Editor's Choice** Feb 16, 1988

- 6MHz-10MHz Switch Selectable Speed
- 80286 Processor
- Retas 9.4 on Norton's SI Benchmerk Test 4.0
- 512KB RAM
- 5060, 5151, or 101-Key Enhanced Keyboard (Your Choica)
- Clock/Calender w/Battery Backup
- One-Yeer Limited Warranty
- 200-Watt Power Supply
- 1.2MB Floppy Drive

"Ovarall, tha Standerd-286/10 appeers to ba ona of tha most attractive values.... It comes with e good complement of manuals and softwara and performa precisely as you would axpect. You should be happy with this one."

— Alfred Poor
PC Magazine, Feb. 16, 1988

$995

Standard-286/12

- 6MHz-12MHz Switch-Selectable Speed
- 1MB RAM

$1195

Both Systems Include...

- 0 Wait State Processing
- 80286 Processor
- 5060, 5151, or 101-Key Enhanced Keyboard
- 1.2MB Floppy Drive
- Clock/Calendar w/Battery Backup
- One-Yaar Limited Warranty
- 200-Watt Power Supply

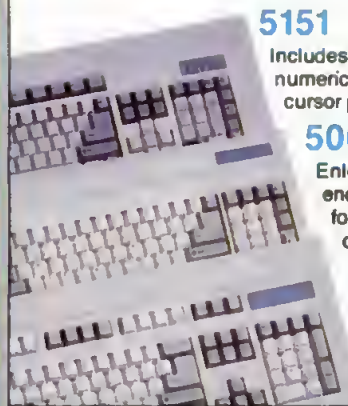
Standard-286/8

- 8MHz-8MHz Switch-Selectable Speed
- 512KB RAM

$895

PC MAGAZINE **Editor's Choice** Feb. 16, 1987

Keyboards



5151
Includes separete numeric and cursor peds $69

5060
Enlerged Enter end Shift keys for easy operation $69

101-Key
101-key enhanced keyboard with twelve function keys $69

Standard *Turbos*

- Eight Expansion Slots
- 8088 Processor
- 360KB Diskette Drive With Controller
- 5060, 5151, or 101-Key Enhanced Keyboard (your choice)
- One-Yeer Limited Werrenty

Turbo/10
- 4.77MHz-10MHz Processing Speed
- 640KB RAM **$495**

Turbo/8
- 4.77MHz-8MHz Processing Speed
- 256KB RAM **$449**

CompuAdd,
a standard for mail-order excellence since 1982.
Call for a free Catalog:
1-800-666-1872

CompuAdd
"Personal Computer Products"

12303-G Technology Blvd. Austin, Tx. 78727

Switch Boxes

Manual (25-pin)
- 2 Computers, 1 Peripheral $15
- 2 Computers, 2 Peripherals $19
- 3 Computers, 1 Peripheral $19
- 4 Computers, 1 Peripheral $23

(36-pin version also available.)

Automtic (25-pin)
- 4 Computers, 1 Penpheral $65
- 8 Computers, 1 Peripheral $89

(Available for serial or parallel.)

STARTER KITS. . .

For Everything You Need To Begin Serious Computing Immediately!

PC FullBak

PC MAGAZINE

Editor's Choice
May 31, 1988

Professional Starter Kit — $1395

Computer-286/10 system with 80286 processor (with switch-selectable 6MHz/10MHz processing speeds), 512KB RAM (expandable to 1MB on motherboard), 8 expansion slots, 200-watt power supply, 1.2MB floppy drive, your choice of keyboard, dual floppy/hard drive controller, clock/calendar with battery backup, and system reset button.

Monographics Video-High-resolution (750 pixels × 350 lines) amber monochrome monitor with 12" screen, monochrome graphics card with parallel port.

Hard Drive- 20MB hard drive, fully installed.

40MB Hard Drive Option- Upgrade your 20MB hard drive to a 40MB, fully installed for only $100 above the base price.

Printer-Epson® LX-800 with draft (150-180CPS) or near letter quality printing, multiple typestyles, Epson character graphics set, dot graphics capability.

Software-Professional Zen Software, a totally integrated software package: **ZenWord™, ZenCalc™,** and **ZenLink™, MS-DOS®** operating system, **GW BASIC®** programming language, and **PC FullBak** backup utilities also are included.

Accessories-200 sheets continuous form paper, printer cable, and 10 double-sided, high-density blank diskettes.

Career Starter Kit — $795

Computer-IBM® -compatible Standard Turbo/10 computer with 8088 processor, keyboard-selectable 4.77MHz or 10MHz processing speeds, 640KB RAM, half-height 360KB floppy drive, floppy drive controller, 150-watt power supply, your choice of keyboard, and system reset button.

Monographics Video-High-resolution (750 pixels × 350 lines) amber monochrome monitor with 12" screen, monochrome graphics card with parallel port.

20MB Hard Drive Option- Add the storage power of a 20MB hard drive to your Career Starter Kit. Fully installed for only $269 above the base price. Option includes PC Fullbak backup software.

Printer-Star Micronics NX-1000™ provides software compatibility, plus 120cps draft and 30cps near letter quality printing, multiple type styles, nine-pin print head, Epson LX-800 and IBM Proprinter II® emulation, dot graphics capability, and tractor/friction paper feed.

Software-Professional Zen Software, a totally integrated software package: **ZenWord, ZenCalc,** and **ZenLink. MS-DOS** operating system, and **GW BASIC** programming language also are included.

Accessories-200 sheets continuous form paper, printer cable, and 10 double-sided, double-density blank diskettes.

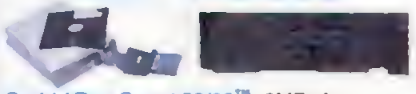
Professional Starter Kit EGA

Industry-standard 14" tube size EGA monitor, EGA card, and I/O card with serial and parallel ports . . **$1795**

Career Starter Kit EGA

Industry-standard 14" tube size EGA monitor, EGA card, and I/O card with serial and parallel ports . . **$1195**

PS/2® Products



Orchid RamQuest 50/60™ 2MB of EMS memory, Lotus/Intel/Microsoft compatible **$669**

Everex Evercom II 24™ 2400 baud internal modem with BitCom software, includes auto-answer and auto-voice switchover **$179**

Taxan TDM-5™ External Floppy Drive allows PS/2 models to read 5.25" diskettes, 360KB format compatibility **$299**

Office Facsimiles

Sharp FO-150 high speed, 8 shading levels, auto contrast, built-in phone. **$1049**

Sharp FO-210 features above plus autofeed and speed dialing . . . **$1399**

Floppy Drives

360KB for PCs/XTs (black) **$99**
360KB for ATs (gray) **$109**
720KB, 3.5" for ATs (gray) **$115**
1.44MB, 3.5" for ATs (gray) **$135**

Printer Supplies

64KB Print Buffers
1 Computer, 1 Peripheral **$63**
2 Computers, 1 Peripheral **$86**

256KB Print Buffers
1 Computers, 1 Peripheral **$135**
2 Computers, 1 Peripheral **$149**
(Centronics parallel interfaces.)

Print Mufflers
80-column (19" × 16" × 8.5") **$45**
132-column (26" × 16.25" × 8.5") . . . **$59**

CompuAdd

"Personal Computer Products"

12303-G Technology Blvd. Austin, Tx. 78727

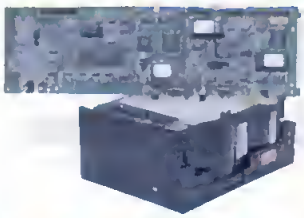
ORDER TOLL FREE:
800-666-1872
Inside USA

Customer Service: 800-999-9901
FAX: 512-250-5760
Telex: 763543 COMPUADD AUS
Outside USA: 512-258-5575

GREAT BUYS . . .

On Brand Names Including MiniScribe, Seagate, AST, Panasonic, and More!

Mass Storage Hard Disk Drives



CDC Hard Disk Drive

- 18ms Access Time ESDI-Certified Hard Drive
- 10Mbit Per/Sec ESDI Dual Hard Drive/Floppy Controller
- 1:1 Interleave Controller

150MB **$1599**

Maxtor Hard Disk Drive

- 16ms Access Time ESDI-Certified Hard Drive
- 10Mbit Per/Sec ESDI Dual Hard Drive/Floppy Controller
- 1:1 Interleave Controller

338MB **$2575**

For ATs® andCompatibles

- One-Year Limited Warranty
- Linear Voice Coil Closed Loop Servo System
- Whitney Technology and Sliders
- Fail-Safe Automatic Actuator Lock
- Low 14-Watt Standby Power

43MB (25ms) **$569**
71MB (28ms) **$749**
110MB *Price Reduced!*
(28ms, RLL Controller) **$1125**

For PC/XTs®, Compatibles, and Compaq®

- Cables
- Mounting Hardware
- Western Digital® Controller
- Complete, Illustrated Installation Manual

20MB MiniScribe (65ms) . . . **$279**
30MB Seagate (65ms) **$310**
40MB MiniScribe
Price Reduced! (61ms) **$379**
20MB for
Compaq Portable **$299**

AST®

AST SixPak Premium™ 384KB RAM, Serial, Parallel Port, Clock/Calendar **$197**

AST Advantage™ 128KB RAM, Serial, Parallel Port **$228**

AST Rampage® 2 64KB RAM for the IBM® PC **$229**

ORCHID®

Tiny Turbo 286™

- Uses 80286 Processor
- Keeps 8088 in System
- Processor Selectable to Ensure 100% Compatibility
- Optional 80287 Math Coprocessor

$299

Printers

Panasonic 1091i 80 columns, 160cps draft, 32cps NLQ **$199**

Okidata® 192+ 80 columns, 200cps draft, 40cps NLQ **$329**

Epson FX-286e 132 columns, 240cps draft, 48cps NLQ **$482**

Epson LQ-1050™ 132 columns, 264cps draft, 88cps NLQ **$818**

FREE PC-FULLBAK

With Every Hard Drive or FlashCard Purchased!

- Easy to Use
- Backs Up and Restores Files
- Menu-Driven or Use From DOS

WESTLAKE DATA

$59.95 Value!

FlashCards™

PC MAGAZINE
Editor's Choice
PC Magazine Vol. 6-3

- Western Digital Controller
- One-Year Limited Warranty
- Installs in Minutes
- 3½" Hard Disk
- Can Boot From FlashCard
- Shock Mounted

FlashCard-20™ (MiniScribe, 65ms) **$319**
FlashCard-30™ (MiniScribe, 65ms) **$339**
FlashCard-49™ (Seagate, 28ms) *Price Reduced!* **$539**

Cables

Parallel Printer Cables
6' (DB25M to C36M) **$8.95**
10' (DB25M to C36M) **$11.95**
6' for Tandy 1000 . . . . . **$8.95**
AT Serial Cables
6' (DB9F to DB25M) **$7.95**
10' (DB9F to DB25M) **$10.95**
XT Serial Cables
6' (DB25F to DB25M) **$7.95**
10' (DB25F to DB25M) **$10.95**

CompuAdd

"Personal Computer Products"

12303-G Technology Blvd. Austin, Tx. 78727

Cables

Full Pin Cables
6' (DB25M to DB25F) **$7.95**
10' (DB25M to DB25F) **$10.95**
6' (DB25M to DB25M) **$7.95**
10' (DB25M to DB25M) **$10.95**
Centronics® Cables
6' (C36M to C36F) **$10.95**
10' (C36M to C36F) **$13.95**
6' (C36M to C36M) **$10.95**
10' (C36M to C36M) **$13.95**

ENHANCEMENT ENERGY

Brighten It Up, Speed It Up, Talk It Up With CompuAdd-Ons

Convenient Sales Hours!
M-F 8 a.m. — 9 p.m. CST
Sat. 9 a.m. — 5 p.m. CST

Monographics Video

Monographics Card
Text Mode 80 Columns x 25 Rows, Graphics Mode 720 Pixels x 348 Lines, Parellel Port $65

Samsung
12" Flet Screen With Tilt & Swivel Base $95

Mono Combo Monographics Card end Monitor $139

EGA Video

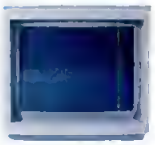
EGA Card
640 Pixels x 350 Lines, 256KB Display RAM $129

EGA Monitor
14" Tube, High Resolution $349

EGA Combo EGA Card and Monitor $469

Color Video

Color Card
640 x 200 w/Parallel Port $59



Color Monitor
CGA Monitor $239

CGA Combo Color Card and Monitor $289

Ultimate EGA Video

Video 7® Vega Deluxe™
640 x 480, EGA, Color, and Monographics Standards, Ultra-High Resolution $249

NEC Multisync II®
Up to 800 x 675 Resolution, .31mm Dot Pitch, 14" Tube Size . . . $679

Ultimate Combo Video 7 Deluxe and NEC Multisync II . . $869

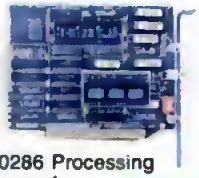
VGA Cards

- IBM® VGA Compatible
- Digital/Analog Output
- Up to 800x600 Resolution.
- Software Drivers Included
- Long-Term Warranties

New!

Vega VGA from Video Seven $299
VGA Plus from Paradise $269

Charge Card



80286 Processing Power for the PC $269

Internal Modems

1200 Baud Standard . . . $69
1200 Baud Everex $99
2400 Baud Standard . . $139

External Modems

1200 Baud Standard . . . $89
2400 Baud Standard . . $159
2400 Baud Everex $239

PC-MFC

PC/XT® Multifuction Card
384KB RAM, Parallel Port, Clock/Calendar, Game Port, Serial Port, and Software for PCs or Compatibles . $199

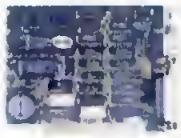
AT-MFC

AT® Multifunction Card
Up to 1.5MB RAM Expansion, Serial & Parallel Port for ATs and Compatibles w/0K $110

Memory Cards

MEM-576 w/0K $35
EMS PC w/0K $99
EMS AT w/0K $119

I/O Cards



AT I/O
Serial & Parallel Port . . . $59
PC I/O
Also Has Clock/ Calendar & Game Port . $65

CompuAdd CIRCLE 294 ON READER SERVICE CARD

We offer the best service and support available in the mail order industry, so you can purchase with confidence!

- FREE one-year limited warranty
- FREE one-year technical phone support
- FREE 30-day, money-back guarantee
- FREE credit card ordering — no surcharge

We accept MasterCard, VISA, money orders, certified checks, personal checks (please allow 10 days for processing), CODs ($50 minimum order), company and institutional purchase orders, and wire transfers.

Add 2% per order for shipping and handling (minimum $2). All return items must be accompanied by a Return Authorization number; call our technical support/customer service department. Texas residents, please add 8% sales tax. Add 5% for shipping/handling to APO/FPO addresses. Software is non-refundable. For a copy of our warranty policy, call or write to the address shown. Thirty-day money-back guarantee does not include freight. All prices are subject to change without notice.

Corporate and Institutional Accounts

We are dedicated to providing the professional service you require to keep your business running smoothly. We accept purchase orders on a Net Terms basis with approved credit and a minimum purchase of $50. We provide a full-time technical staff to answer your questions and make fast repairs, if needed. Call us today: We Make Your Job Easier!

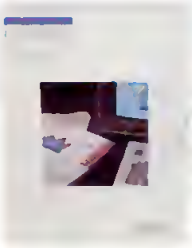
CompuAdd is an established leader in the computer industry. We offer superior prices, products, customer support, and service!

ORDER TOLL FREE:
800-666-1872
Inside USA

Customer Service: 800-999-9901	**FAX:** 512-250-5760
Telex: 763543 COMPUADD AUS	**Outside USA:** 512-258-5575

SOFTWARE SPECTACULAR!

A Sensational Selection of Popular Software



Quattro™
by Borland International

Quattro's advanced technology offers increased power and speed in the hottest spreadsheet on the market. Save time using spreadsheet shortcuts to alter row/column length, paging, or create quality graphs. The intelligent Recalc function saves you even more time by recalculating only those elements that have changed. The SQZ! feature saves memory by automatically compacting/expanding your spreadsheets up to 95%. Best of all, there are no tough commands to learn — Quatttro uses easy-to-learn 1-2-3® macros! It supports expanded memory specifications and EGA, CGA, and VGA adapters to get the most out of your hardware.

Limited-time special . . . **$109**

WordPerfect®
by WordPerfect Corporation

WordPerfect, the number one word processing choice, offers you a powerful word processor with all the conveniences, including automatic format, split-screen edit, five-field sort, mail merge, macro capabilities, 100,000-word dictionary, thesaurus, spelling checker, and online tutorial. It easily converts your files from WordStar, MultiMate, and other popular software packages for maximum compatibility. This winner of *PC Magazine* Editor's Choice (February 29, 1988) for word processors is sure to be a welcome addition to your writing environment.

Limited-time special . . . **$189**

Flight Simulator
by Microsoft

Flight Simulator's challenging realism and graphics make it the aerial simulation standard! Perfect your landings at Chicago's Meigs Field, then fly cross-country to Los Angeles, New York, or other cities using radio navigation aids and visual landmarks. (Scenery disks for several U.S. regions are also available.) When you're ready, try instrument landing approaches in bad weather, or pit your skills against enemy fighters using the *World War I Ace* option.

Limited time special **$29**

Communications

Carbon Copy Plus	$110
Carbon Copy Plus (3.5")	$110
Smartcom II	$85
CompuServe Subscription Kit	$21
Crosstalk XVI	$99

Compilers and Languages

Clipper (Summer '87)	$394
Microsoft C Compiler	$300
Microsoft COBOL Compiler	$467
Microsoft FORTRAN Optimizing Compiler	$300
Microsoft Macro Assembler	$100
Microsoft QuickBASIC Compiler	$61
Microsoft QuickC	$66
Turbo BASIC	$57
Turbo C	$63
Turbo Pascal	$62

Data Bases

dBASE III+	$409
Microsoft Works	$129
Paradox	$456
PFS: Professional File	$144
Q&A	$199
Rapidfile	$209
R:Base for DOS (Single User)	$456

Desktop Publishing

Aldus PageMaker	$545
FONTASY	$36
Microsoft Chart	$263
PFS: First Publisher	$57
PFS: First Publisher Art Gallery	$75
Printmaster Plus	$30
Ventura Publisher	$529

Educational

Learning DOS	$32
Math Blaster Plus!	$29
Math Maze	$20
Reader Rabbit	$25
Typing Tutor IV	$32
Typing Tutor IV (3.5")	$34

Financial

Dac-Accounting/ Accounting Lite	$113
Dac-Easy Accounting	$57
Dac-Easy Light	$40
Dac-Easy Payroll	$40
Managing Your Money	$125
Quicken	$28
Sylvia Porter's Financial Planner	$55
Timeslips III	$113
Sylvia Porter's Swiftax	$40

Games

Ancient Art of War at Sea	$25
Balance of Power	$28
Bard's Tale	$30
California Games	$23
Chessmaster 2000	$24
Chuck Yeager Flight Trainer	$24
Destroyer	$25
Earl Weaver Baseball	$24
F-15 Strike Eagle	$25
Falcon	$25
Flight Simulator (Regular Price)	$35
Gauntlet	$23
Gunship	$28
Hardball	$20
Helicopter Simulator	$28
Ikari Warrior	$23
Jeopardy	$7
Jet	35
King's Quest III	$30
Leisure Suit Larry	$23
Mean 18 Golf	$20
Mean 18 Course Disk	$10
NBA	$21
Pirates	$23
Scenery Disks for Flight Simulator and Jet	$18
Space Quest	$28
Space Quest II	$28
Superbike Challenge	$11
Test Drive	$20
Wheel of Fortune	$7
Where in the USA is Carmen Sandiego	$30
Where in the World is Carmen Sandiego	$30
Wizardry: Proving Grounds	$34
World Games	$25
Wrath of Nikademus	$22

Graphics

Boeing Graph	$199
Certificate Maker	$25
Chartmaster	$222
Freelance Plus	$343
Freelance Plus (3.5")	$343
Form Tool	$54
Gem Draw Plus	$189
Generic CADD	$50
Graph-in-the-Box	$70
Harvard Graphics	$279
PC Paint	$53
Print Shop	$34
Print Shop Companion	$28
Windows Draw	$189
Windows Graph	$249

Organizational

Harvard Total Project Manager	$367
Microsoft Project	$330
Timeline	$280
Timeline (3.5")	$280

Spreadsheets

Enable	$394
Framework	$345
Javelin Plus	$157
Microsoft Excel	$330
Microsoft Multiplan	$130
PFS: First Choice	$79
Quattro (Regular Price)	$123
Surpass	$339
Symphony (3.5")	$468
VP-Planner	$55

Utilities

Copy II PC	$23
DESQview	$74
DESQview (3.5")	$74
Disk Optimizer	$39
Fastback	$92
Fastback Plus	$95
Fastback Plus (3.5")	$95
GOfer	$40
Mace Utilities	$50
Microsoft Windows	$66
Microsoft Windows 386	$130
Norton Utilities Advanced Edition	$79
PC-FullBak	$49
PC Tools Deluxe	$40
SideKick	$50
Sideways	$40
SQZ! Plus	$57
XTREE	$35
XTreePro	$65

Word Processors

Bank Street Writer Plus	$45
Gramatik II	$50
Microsoft Word	$229
MultiMate Advantage	$269
Network Word	$100
PFS: Professional Write	$115
Q&A Write	$106
Websters New World Combo	$51
Webster New World Professional Thesaurus	$76
WordPerfect (Regular Price)	$215
WordPerfect (3.5")	$214
Word Perfect Executive	$110
WordStar Professional	$239
WordStar 2000+ Personal	$279

CIRCLE 279 ON READER SERVICE CARD

mode into a simple BBS system as well.

One of *ProComm*'s strong points is its wide range of eight file-transfer protocols. The *ProComm* menu choices include Xmodem (actually Xmodem-CRC with fallback), Modem7, Ymodem (actually Xmodem 1K), Ymodem batch, Telink, WXmodem, Kermit (with sliding windows and data compression), and CompuServe-B. *ProComm Plus* adds such protocols as Sealink, Imodem, Ymodem-G (actually a streaming Xmodem 1K), and YmodemG batch, as well as CompuServe Quick-B.

Terminal emulation is another plus. *ProComm* offers emulations for an impressive list of popular terminals: the well-known DEC VT-52 and VT-100, and IBM 3101 terminals, as well as selected models from TeleVideo, ADM, Heath, ADDS, and Wyse. It also provides ANSI emulation for a total of ten emulations. *ProComm Plus* adds five additional models in the same product families.

ENHANCED SCRIPT LANGUAGE With either version of *ProComm*, you can attach scripts to a dialing directory entry. You can also call a script from within another script or invoke a script when starting the program. Script control commands in *ProComm* include simple decision (If), case statement, execution of an internal subroutine, and jump (GOTO). The *ProComm Plus* script language, called Aspect, is a greatly enhanced version of the *ProComm* language. New features include looping commands, display control commands, additional string-handling commands, and mathematical functions. Most important for ease of use, *ProComm Plus* has a learn mode for automatically creating scripts.

ProComm comes on one disk, in a compressed format called ARC, for archive. To install it, you run the supplied archive-extracting program and copy it to your working disk or directory. You can then start the program and set the defaults. The *ProComm* manual is included on-disk. A printed version is optional. *ProComm Plus* comes on two disks. The files are in a noncompressed format and are accompanied by a slick installation program. The install program includes a configuration routine that will help you set your initial defaults. *ProComm Plus* also comes with a printed manual as standard.

A GOOD VALUE *ProComm* is an excellent communications tool that can satisfy the needs of most users. *ProComm Plus*, for a modest additional price, offers extra features as icing on an already attractive cake. Both versions of the program are easy to use and packed with features. Although performance in file transfer is slower than with many other programs, this should be an issue only if you do a great deal of file transfer at long-distance rates. For most purposes, *ProComm*'s performance is adequate. If your communications needs are casual to moderate, either version of *ProComm* is a good choice. **—Kenneth H. Werner and M. David Stone**

EDITOR'S CHOICE

FACT FILE

Datastorm Technologies Inc
P.O. Box 1471
Columbia, MO 65205
(314) 474-8461

***ProComm*, Version 2.4.2**
List Price: $50
Requires: 128K RAM, DOS 2.0 or later.

CIRCLE 674 ON READER SERVICE CARD

***ProComm Plus*, Version 1.0**
List Price: $75
Requires: 192K RAM, DOS 2.0 or later.
In Short: This popular shareware program is easy to learn and use yet offers a full range of features, including a choice of eight file transfer protocols, ten terminal emulations, a password-protected host mode for remote file transfer, and a full-function script language—all at a low price. *ProComm Plus*, best thought of as an enhanced version of *ProComm*, includes all the features of the popular shareware program plus such improvements as a companion text editor, more-readable screens, individual passwords for the program's host mode, and additional file-transfer protocols. If you like *ProComm*, the extra $25 for *ProComm Plus* is well worth it. Not copy protected.

CIRCLE 673 ON READER SERVICE CARD

Professional-YAM

At first glance, *Professional-YAM* can be intimidating. It looks like the ideal communications program for people who feel that DEBUG is as friendly a word processor as they will ever need.

Omen Technology makes the program available through an interesting procedure in which you simply call up CompuServe or GEnie, or Telegodzilla, the Omen BBS—and download a squeezed version of the program. Once you register the program, you receive a serial number and a distribution disk with files to unsqueeze the program files and bring *Professional-YAM* to life. You cannot get a working copy without a valid serial number, but, after you get one, you can copy the program at will, and your serial number entitles you to free program updates.

The features in this $139 package could fill a small book. *Pro-YAM* has an incredible command language. The reference card lists more than 400 commands, parameters, and other settings that you can access from the command line. You can also incorporate these into scripts that can automate everything from unattended file transfers to reminders to call home to say you will be late for dinner.

File-handling commands let you look at the contents of files, cut out sections, and append them to other files. You can

FACT FILE

Omen

***Professional-YAM*, Version 17.01**
Omen Technology
17505-V NW Sauvie Island Rd.
Portland, OR 97231
(503) 621-3406
List Price: $139
Requires: 96K window (256K RAM recommended), two disk drives (hard disk recommended), DOS 2.0 or later.
In Short: *Professional-YAM* is not a program for newcomers to communications. But its range of commands and the sheer number of file-transfer protocols available may make it the program of choice for those who can put up with its command-based interface. Not copy protected.

CIRCLE 686 ON READER SERVICE CARD

Buy one, get one free.

Five productivity enhancers proven by over 300,000 PC users.

Buy any one of these SoftLogic products and get any other one free. Look for these specially marked packages at your favorite dealer. Then just fill out the "FREE Software" coupon you'll find inside and mail it to us. It's that simple.

Coupon contained only in packages marked "FREE Software" and redeemable by users who register by 9/30/88. Void where prohibited.

True multi-tasking that's easy to use. $69.95

For instant do-it-yourself data integration. $99.95

Switches instantly among programs and files $79.95

New release 4.0 with advanced file recovery tools. $69.95

Compresses 1-2-3 and all other files. $69.95

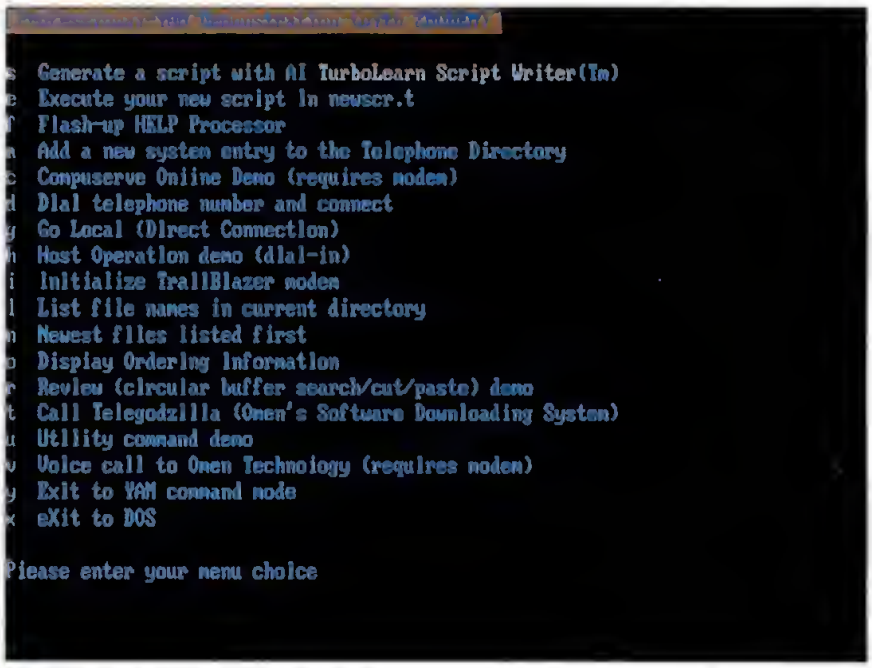
For more information, call 1-800-272-9900.
(603)-627-9900 in NH

SOFTLOGIC SOLUTIONS

SoftLogic Solutions, Inc.
One Perimeter Road
Manchester, NH 03103

9516

Offer Good In USA Only



Professional-YAM *comes with a demonstration script that includes this menu of options—an example of how the* Pro-YAM *interface can be simplified for users through careful script programming.*

browse through directories half a dozen different ways. You can even drop into DOS and issue a command directly.

If you don't feel up to writing complex scripts, the default script automates many procedures for you, such as setting function-key and Alt-key combinations. You can toggle into terminal mode and back to command mode. You can manually dial a number with one command. You can even ask the program to prompt you through the dial-up process, and it will construct a script by recording a communications session and capturing both the host prompts and your responses.

WHAT MORE? *Professional-YAM* offers multiple types of security and encryption, host mode for remote access, automatic logging of incoming and outgoing transactions, nine or more different transfer protocols, and the ability to work with nearly any modem. One protocol is Zmodem, touted to be one of the fastest and most reliable available. What more could anyone want?

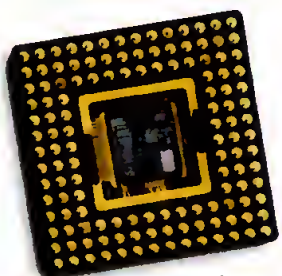
Well, some people would like a program that is easier to use. You can create a script that presents menus and such on the screen, but you have to write it. Not everyone needs seven different DIRectory commands. And many people may be put off by the effort required to get up to speed with this program.

One problem is the manual. It is written in a dense style, with endless lists of parameters and commands and few examples to make usage clear. The two "tutorials" require careful examination of the hypothetical scripts and communications sessions listed in the book with brief annotations. These tutorials don't even appear until Chapters 8 and 25 (out of 35).

Everything in the product is configurable; nothing is static. *Pro-YAM* is also available under Unix, and its influence seems to permeate the program. For example, DOS paths must be specified with the forward slash, /, because the backslash, \, is used by Unix as a command trigger.

Novices may find all this confusing. Indeed, the program displays a bias towards programmers. You can specify an ASCII character to be sent using the Put command, but there are only two number bases that can be used. One is hexadecimal (base

This chip is too smart to be in a personal computer.



The Intel 80386 microprocessor

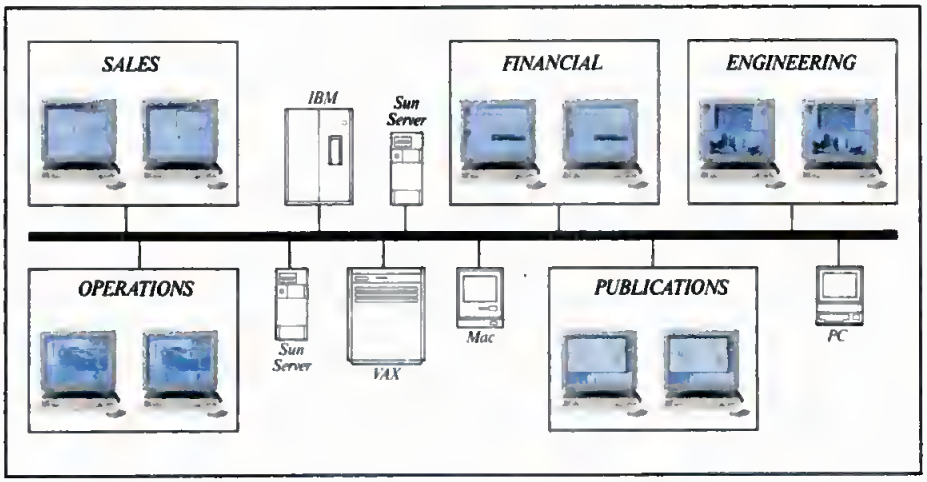
Introducing the corporate 386.

Copyright © 1988 Sun Microsystems, Inc. Sun386*i* and The Network *Is* The Computer are trademarks of Sun Microsystems, Inc. Sun and the Sun logo are registered trademarks of Sun Microsystems, Inc. UNIX is a registered trademark of AT&T. Intel is a registered trademark of Intel Corporation.

The 386-based personal computers offer the individual raw power.

But, in most corporations, the real work is done by many people, all trying to work together. Computers should aid this process, by giving individuals the personal power they need, and by helping groups of people work together productively.

Different groups need to share and work with the same information, even though they may be using different computers, or their data is kept on remote mainframes.



In real-world corporate applications, PC users need access to a large variety of computing resources. So the Sun386i runs Sun's open distributed computing environment, built around the UNIX® operating system. Which lets it become part of a powerful open network that can include every computer in your company.

Personal 386s fall short of meeting these needs. Because they use underpowered and primitive operating systems.

So they can't handle the really demanding applications. And they only talk to themselves, with some difficulty, rather than to all of your computers.

That's why we're introducing the corporate 386. The Sun386*i*™ workstation. It has the same high-performance Intel® 80386 chip as the PCs.

But not their personal limitations.

Because it runs Sun's open, distributed computing environment, built around the UNIX® operating system.

So, you have transparent access to every computer in your company. No matter which vendor's name is on the box.

Unlike the PCs, the Sun386*i* lets you take full advantage of the thousands of powerful applications designed around the UNIX operating system. But it also lets you run all of the PC DOS applications that millions of users have developed so much expertise in.

And with its 5-MIPS power, UNIX and DOS applications can run simultaneously and at full speed.

But with all this power and sophistication, isn't a Sun386*i* harder to use than a PC?

Not at all. In fact, it's easier.

Because we've given it a friendly, icon-oriented user interface with an integrated help facility. And a file organizer, to easily find, open, and keep track of files all over the network.

There's even an automated network administrator, that lets you personally install the Sun386*i* in minutes. Instead of hours.

So look to Sun for total networking solutions that help pull a company together.

If you'd like to know more, call 1-800-223-6736. In CA 1-800-322-6736. And we'll show you the difference between a personal machine.

And the right corporate choice.

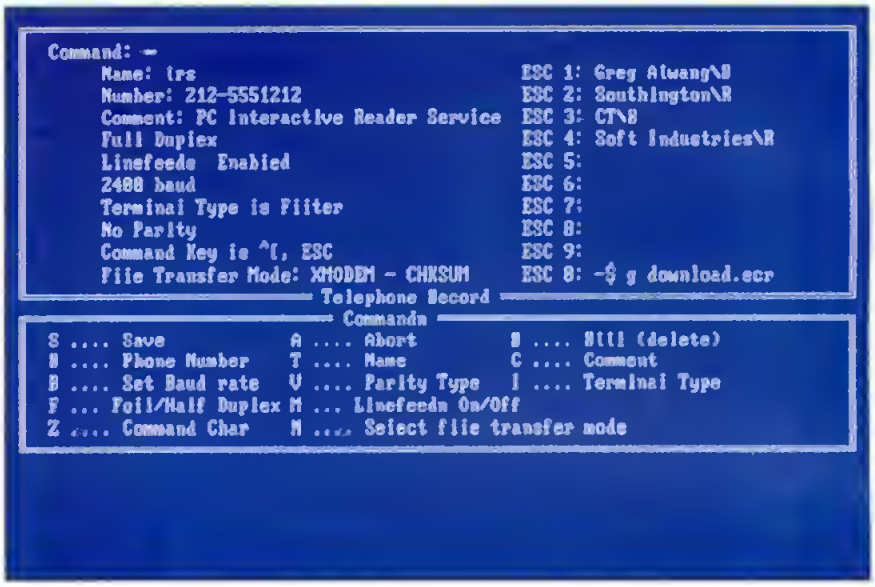
sun microsystems

The Network *Is* The Computer™

CIRCLE 254 ON READER SERVICE CARD

16), which is reasonable enough, but the other is not base 10 (the decimal system, based on a total complement of fingers) as you might expect. It is octal (base 8, as in "forget you have thumbs"). Perfect for those of us who waste all that time translating the actual binary codes for ASCII characters into those troublesome decimal values, but a little hard on the uninitiated.

If you want to take charge of your communications applications or may be having problems with your current system, *Professional-YAM* may be worth a look. On the other hand, if you don't want to invest a lot of time getting on-line, *Professional-YAM* is not for you.—**Alfred Poor**



The Ptel *telephone directory allows you to enter many communications parameters and other useful information for each directory entry. A script command in the Esc 0 command slot will be automatically executed when a connection is made.*

Ptel

Phoenix Technologies' *Ptel*, priced at only $49, can transfer text and binary files and communicate with on-line data services as well as micros, minicomputers, and mainframes. It has a full-featured telephone directory and a powerful script language. And its key combinations let you bypass the command menu for fast, easy access to all commands.

To install *Ptel*, you copy the files from the distribution disk onto the hard disk and run the PTELUP installation program. PTELUP prompts you for most of the communications parameters. The settings act as defaults, but you can change most, except for the modem type, from within the program.

From the command line, you can invoke a command menu that doubles as a help screen, listing each command and the key associated with it. You can also issue commands from the terminal mode, using a "quick-key" combination to bypass the command menu.

Each telephone-directory entry includes ten slots for entering additional data or keystrokes that you need to send to the remote system. *Ptel* treats each Esc slot as a short script file, but the last slot is reserved for an auto-log-on script. The program automatically invokes this command as soon as communications are established. Commands can be used to call other script files.

DEFAULT PROTOCOL PLUSES *Ptel* can use Xmodem, Xmodem-CRC with fallback, Modem7 Batch, Kermit, or Telink protocols. The program uses Telink with CRC error correction as the default. Telink checks the serial numbers of *Ptel* copies. If the same copy of *Ptel* has been installed on two different computers, Telink will recognize the duplication and prohibit file transfers between them.

When *Ptel* encounters an error during a file transfer, it tries to resend the information up to ten times. If the final attempt to transfer is unsuccessful, *Ptel* prompts you to tell it whether or not to continue. It will then continue or abort the transmission accordingly.

You can specify unattended operation by using a script command. In this case, *Ptel* will set an error flag wherever needed so that script commands can detect the error. Another useful feature for unattended operation is automatic redial until a connection is made.

SPEAKING THE LANGUAGE *Ptel*'s line-oriented, interpretive script language is a lot like BASIC and is easy to use. You are given several sample script files that illustrate its many uses. The language allows subroutine calls to other script files (up to ten levels deep) and offers loops by means of labels and GOTO commands.

Several different types of variables make designing script files easy. An intelligent error-trapping variable automatically sets an error flag and then branches to a previously specified label. A special Z command allows you to have the system

PC MAGAZINE FACT FILE

***Ptel*, Version 4.0**
Phoenix Technologies Ltd.
320 Norwood Park South
Norwood, MA 02062
(800) 344-7200
(617) 769-7020
List Price: $49

Requires: 150K RAM, DOS 2.0 or later.

In Short: This low-priced yet full-featured program supports popular file transfer protocols. It's easy to learn and use and it lets you execute all commands by using keystroke combinations as well as from the menu. The script language, which allows subroutine calls and conditional branching, is more than adequate for automating everyday communications procedures. Not copy protected.

CIRCLE 672 ON READER SERVICE CARD

TARGA™16 Videographics.

Good News For People Who've Always Wanted A TARGA 16...

Now less gets you even more!

The NEW Improved TARGA 16 is only $1995!

When we redesigned the industry-standard for high color resolution videographics, we incorporated the latest technological advances. The result is a TARGA 16 with improved video quality, built-in overscan, simultaneous RGB and composite video output and more.

And TIPS is only $795!

Since we lowered the price on our popular TARGA 16, we decided to reduce the cost of its companion, TIPS Imaging Software. The TARGA 16 version is now only $795, a savings of $455. This latest release of the award-winning IBM PC-based paint program lets you create new graphics or enhance images captured by the TARGA 16. So contact your nearest Authorized Truevision Reseller, or call 800/858-TRUE and see how less can become even more.

TRUEVISION INC.

7351 Shadeland Station, Suite 100, Indianapolis, IN 46256 800/858-TRUE
INTERNATIONAL: Canada 416/499-9400 France 33-13-952-6253 Italy 39-2-242-4551 Switzerland 41-1-825-0949
U.K. 44-1-991-0121 West Germany 49-69-612-0010 Other 617/229-6900

Prices quoted are US Domestic suggested retail prices

CIRCLE 150 ON READER SERVICE CARD

© Truevision, Inc 1988

Smarter by Design.

CPU 386/20
Monitor Not Included

CPU 386/16
Monitor Not Included

CPU 286/P
Includes LCD Display

	CPU 386/20	CPU 386/16	CPU 286/P
Standard Features			
CPU	80386-20	80386-16	80286-12
Clock Speed (MHz)	8/16, 10/20	8/16	6, 8/12
Wait State	Zero	Zero	Zero, Norton V3 SI rating: 15.3
RAM	1MB static column	1MB static column	512K DRAM (80ns)
On Board Expansion Memory	Up to 4MB	Up to 4MB	Up to 4MB
System Expansion Memory	Up to 12MB	Up to 12MB	Up to 16MB
Math Co-Processor Support	80287/80387	80287/80387	80287
Controller Card Handles	2 hard disks, 2 floppies	2 hard disks, 2 floppies	1 hard disk, 1 floppy
Disk Drive(s) Included	1.2MB floppy drive	1.2MB floppy drive	20MB hard drive, 1.44MB floppy drive
Clock/Calendar	Yes	Yes	Yes, with 10-year battery life
Ports	2 serial, 1 parallel, joystick adapter	2 serial, 1 parallel, joystick adapter	2 serial, 1 parallel, joystick adapter
Expansion Slots	1 32-bit memory bus, 5 16-bit, 2 8-bit	1 32-bit memory bus, 5 16-bit, 2 8-bit	3 16-bit, 2 8-bit
Keyboard	101-key enhanced	101-key enhanced	86-key
Power Supply (watts)	200	200	200
Reset Switch	Yes	Yes	Yes, with 2-second safety delay
BIOS	Award 32-bit ROM	Award 32-bit ROM	Phoenix
Warranty	1 year	1 year	1 year
System Configurations			
Monochrome System w/Hard Drive	$2,735 $3,130 (40MB)	$2,035 $2,430 (40MB)	n/a $1,795 (20MB)
EGA System w/Hard Drive	$3,185 $3,580 (40MB)	$2,485 $2,880 (40MB)	n/a n/a
Special Note	Also available as CPU 386/20 Tower (optional). Made in U.S.A.	Also available as CPU 386/16 Tower (optional). Made in U.S.A.	22-pound portable includes 20MB hard drive and Supertwist EL backlit LCD. Made in U.S.A.

YOUR SATISFACTION GUARANTEED

*All CPU systems carry a **30 day money back guarantee**. You'll receive a full refund, excluding shipping charges. Returns must be shipped prepaid and insured, as new, and include documentation, as well as a Return Authorization Number on the shipping label. CPU 286 basic systems carry a comprehensive **18 month parts and labor warranty**. CPU 386, 286/P and Turbo XT basic systems are warranted for one year. During the warranty period, we will repair or replace, at our option, any defective part at no additional charge. Add-on products (hard drives, monitors, etc.) carry manufacturer's warranties.*

©1988 Computer Products United, Irwindale, California. All rights reserved. Pricing and system configurations are subject to change without notice.

Better By Desire.

CPU 286/12
Monitor Not Included

CPU 286/10
Monitor not included

CPU TURBO XT
Includes Monochrome Monitor

	CPU 286/12	CPU 286/10	CPU Turbo XT
Standard Features			
CPU	80286-12	80286-10	8088-1
Clock Speed (MHz)	6, 8/12	6, 8/10	4.77/10
Wait State	Zero, Norton V3 SI rating: 15.3	Zero, Norton V3 SI rating: 11.5	Zero
RAM	512K DRAM (80ns)	512K DRAM (100ns)	640K
On Board Expansion Memory	Up to 4MB	Up to 4MB	Up to 540K
System Expansion Memory	Up to 16MB	Up to 16MB	Up to 8MB EMS
Math Co-Processor Support	80287	80287	8087
Controller Card Handles	2 hard disks, 2 floppies	2 hard disks, 2 floppies	2 floppies
Disk Drive(s) Included	1.2MB floppy drive	1.2MB floppy drive	360K floppy drive
Clock/Calendar	Yes, with 10-year battery life	Yes, with 10-year battery life	Yes
Ports	2 serial, 1 parallel, joystick adapter	2 serial, 1 parallel, joystick adapter	1 serial, 2 parallel, game port
Expansion Slots	6 16-bit, 2 8-bit	6 16-bit, 2 8-bit	8 8-bit
Keyboard	101-key enhanced	101-key enhanced	84-key standard
Power Supply (watts)	200	200	150
Reset Switch	Yes, with 2-second safety delay	Yes, with 2-second safety delay	Yes
BIOS	Phoenix	Phoenix	DTK
Warranty	18 months	18 months	1 year
System Configurations			
Monochrome System w/Hard Drive	$1,136 $1,530 (40MB)	$1,035 $1,285 (20MB)	$595 $890 (20MB)
EGA System w/Hard Drive	$1,585 $1,980 (40MB)	$1,485 $1,736 (20MB)	$1,046 $1,340 (20MB)
Special Note	Features Selectable System Bus Timing for add-on board compatibility. Made in U.S.A.	Also available in optional full size case with five drive bays. Made in U.S.A.	$595 Complete. Includes 12" high resolution monitor and Hercules compatible graphics card.

TO ORDER, CALL (800) 824-2936

We accept Visa, MasterCard, and cashier's checks. Purchase orders welcome with approved credit. Personal checks take 15 days to clear. Written inquiries should be sent to CPU, Dept. 28, 12803 Schabarum Avenue, Irwindale, CA 91706. Hours: Monday through Friday, 7 a.m. to 6 p.m. PST; Saturday, 10 a.m. to 3 p.m. PST.

Computer Products United

In California: (800) 662-6111
Local Inquiries: (818) 338-5959
Tech Support: (818) 814-2367

VISA MasterCard

CIRCLE 163 ON READER SERVICE CARD

wait until a specified time of day to continue processing, which is ideal for unattended operation. However, *Ptel* offers only remote file-transfer features rather than full-fledged remote operations.

Ptel's documentation is clear and concise. The tutorial section dives right into the script language. It begins by walking you through a prewritten script designed for logging on to an on-line service.

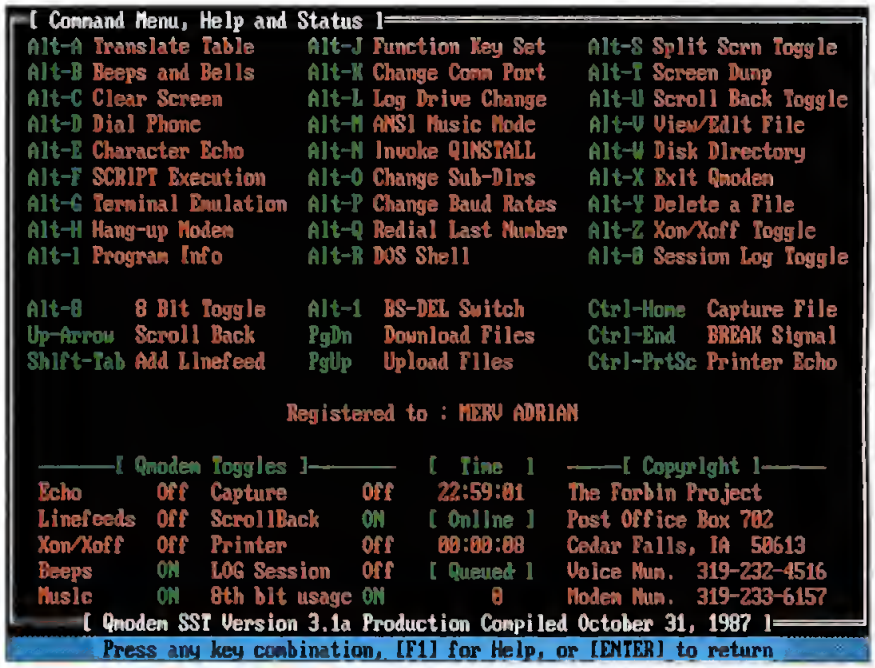
An inexpensive communications program with a full-featured script language, *Ptel* is a no-frills, no-headache program.—**Greg Alwang**

Qmodem

Qmodem, a popular shareware communications program, was long a favorite of the BBS crowd. Recently eclipsed by *ProComm* and *Boyan*, *Qmodem* came roaring back with a new version, renamed *Qmodem SST*, Version 3.1, and packed with exciting features.

Qmodem author John Friel maintains a bulletin board from which you can receive the program and participate in conferences with persons producing beta protocols. You can purchase *Qmodem* through the bulletin board as well, making payments on-line with your credit card. The price of the program is $50.

Hooks in *Qmodem* permit it to call outside programs that implement new error-correcting protocols besides those built into the program. In the current version of *Qmodem*, external protocols include Kermit and windowed Xmodem (sliding windows), as well as protocols designed to work with the newer modems that perform their own error correction.



Qmodem's main help screen shows the rich set of functions available at a keystroke. Note that your choice of external editors may be installed to replace the program's Edlin default.

QINSTALL, the install routine in *Qmodem*, allows access to virtually every feature and parameter setting you might wish to change in the program, including colors and window location, as well as the usual communications and hardware parameters.

You can change settings while *Qmodem* is running. Better yet, QINSTALL has fully context-sensitive help. When you set a parameter, you can press F1 to receive a lucid explanation of its importance and meaning. *Qmodem*'s manual is outstanding and includes a comprehensive index and a handy reference guide to the script language.

Qmodem's powerful script language includes a number of exciting capabilities, such as built-in commands that let you create menus in your scripts. You can handle input information in many ways. One is with the Get command, which simply accepts the keyed information into a variable. You can also read information from the data feed to which you're connected. The program permits looping and branching based on an indexed variable. A Push and Pop stack facility and subroutine handler permits flexible script design. *Qmodem* gives you the ability to call one script from within another, and a DEBUG facility lets you test a script as you create it. Editing is done through a file view facility that can be simply tailored to your use.

You can execute a script three ways: by linking a script to a number in the dialing directory and then entering the number, by invoking Alt-F, or by attaching it to a macro key. Keyboard macros provide a handy tool with which you may assign up to 40 key combinations (various shifted and unshifted states of the function keys).

Four terminal emulation modes are supported, and there is an option to exit but leave DTR set so that you don't drop your line if you have to leave the program.

SCROLLING SCRIPTS *Qmodem*'s DOS shell is robust and doesn't need much memory for basic operation. You can run quite a few products within the shell if you

PC MAGAZINE FACT FILE

***Qmodem*, Version 3.1A**
The Forbin Project
P.O. Box 702
Cedar Falls, IA 50613
(319) 232-4516
List Price: $50 (with disk and manual).
Requires: 256K RAM, two disk drives (hard disk recommended), DOS 2.0 or later.
In Short: Popular shareware product. Lacks automatic host mode and auto-dialback, but versatile script language lets you program those abilities. Not copy protected.

CIRCLE 685 ON READER SERVICE CARD

TURBO-COOL™

150/200 PC/XT POWER SUPPLY

FEATURES

	ORDINARY XT POWER SUPPLY	TURBO-COOL 150/200
PC/XT Compatible	●	●
4 Drive Connectors	●	●
Selectable Input	◑	●
FCC-B Compliance	◑	●
UL Recognized	◑	●
Overvoltage & Short Circuit Protection	◑	●
Heavy Duty Components & Individual Heat Sinks	○	●
TTL Compatible Power Good	○	●
Sinusoidal Current Power Stage	○	●
Twin Fan Cooling	○	●
U.S. Design, Final Assembly, & Testing	○	●
Immediate Replacement 1 Year Warranty	○	●

○ = no ◑ = typically no, depends on manufacturer ● = yes

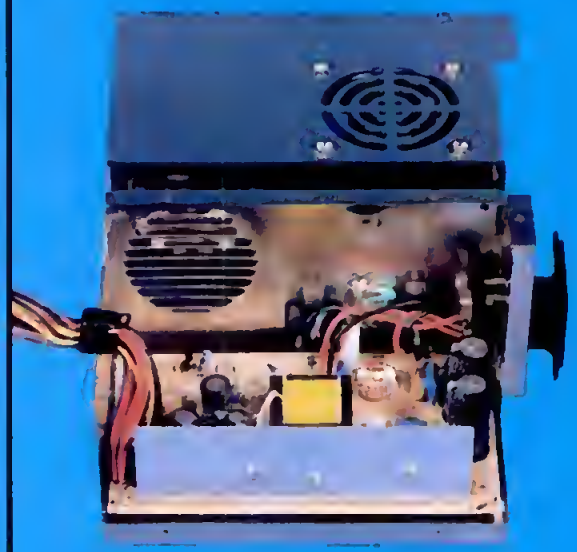
PERFORMANCE

	ORDINARY XT POWER SUPPLY	TURBO-COOL 150/200
Actual Power Output:	90-150 Watts	155W/205W
Regulation:	5%-15%	4%
Ripple and Noise:	1%-3% (p-p)	1% (p-p)
Holding Time:	5ms-16ms	18ms
Cooling Capacity:	50-85 Watts	200W/245W
Accoustical Noise:	44db	41db/44db

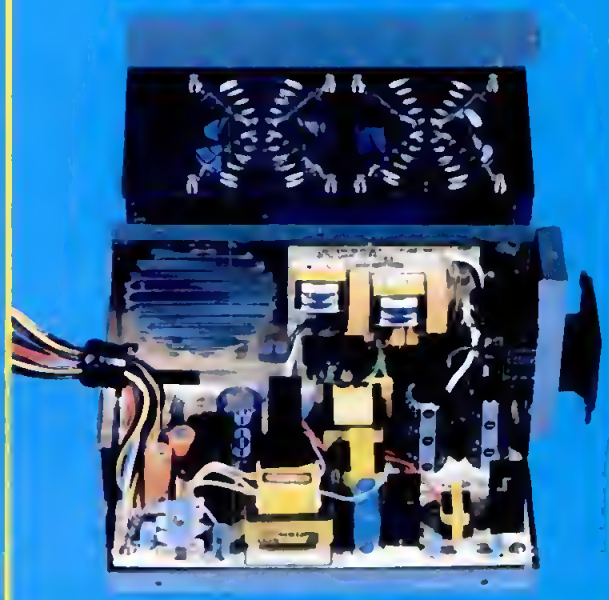
CIRCLE 473 ON READER SERVICE CARD

PC COOLING SYSTEMS, INC.
31510 Mountain Way
Bonsall, CA 92003
(619) 723-9513

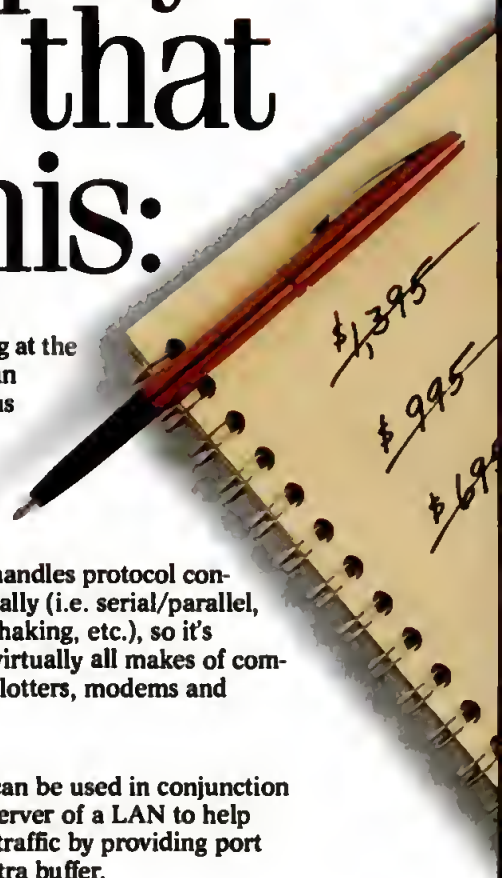
ORDINARY 150



TURBO-COOL 150



How much would you pay for a device that does all this:



• Print Master II lets all your computers easily share all your printers, plotters, and modems, reducing the cost per user of expensive peripherals.

• Print Master II spools print jobs in its smart 256K buffer (field expandable up to 768K), then outputs them in sequence to keep your computers and printers working.

• Print Master II allows computers to select each other so you can share data bases and transfer files.

• Print Master II makes choosing a connection as easy as moving your cursor. You select where you want your data to go from a pop-up menu generated by BayTech's memory resident program.

• Print Master II, Model 808E, features eight flexible ports: six serial and two parallel. You can set *any* port, including both parallel ports, as a computer port or a printer port.

• Print Master II's serial ports operate at *real* speeds up to 9600 baud, even when all ports are operating at the same time. You can set baud rates, plus other configuration changes, for each port.

• Print Master II handles protocol conversion automatically (i.e. serial/parallel, baud rates, handshaking, etc.), so it's compatible with virtually all makes of computers, printers, plotters, modems and peripherals.

• Print Master II can be used in conjunction with the printer server of a LAN to help off-load network traffic by providing port expansion and extra buffer.

• Print Master II features many little extras that make a big difference in performance: shielded connectors, a built-in power supply, easy-to-read configuration menus, fewer parts for higher reliability, sturdy metal case.

How about $595? Call us to order direct or for the name of your nearest dealer.

BayTech

Bay Technical Associates, Inc., Data Communications Products Division
200 N. Second St., Bay Saint Louis, MS 39520 USA
Telex 910-333-1618 BAYTECH, Telephone 601-467-8231 or toll-free

800-523-2702

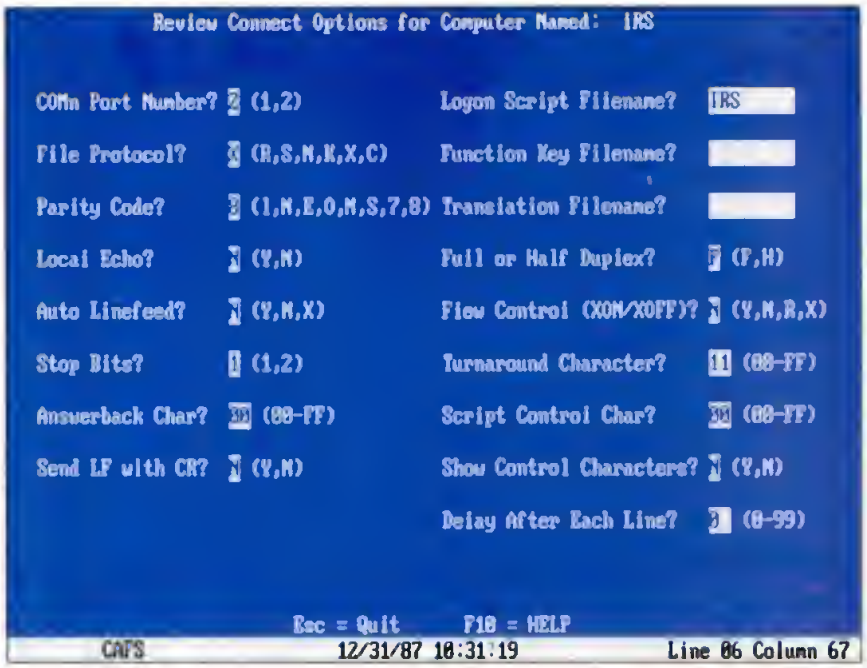
CIRCLE 172 ON READER SERVICE CARD

haven't used the extensive buffer expansion capabilities. However, when you need scrollback capability to go back within a session, or if you want to expand the download buffer to reduce dependence on disk writes, you may easily do so within QINSTALL. In fact, paging through the scrollback buffer is a nice way to develop scripts: log the session, scroll back, use the screen capture facility, and edit the file created by the capture. It's sort of a poor man's learn mode.

Qmodem does not include a timed execution facility but does have an excellent circular dialing facility that can allow unattended operation. The time between redials may be specified, and you can log activity for inspection the next day.

Qmodem comes with a series of easy-to-edit scripts for services like CompuServe and MCI Mail, as well as BBS software. Background operation can be done with only OS/2 or programs like *DESQview* that have their own facilities for background processing.

You also will not find an embedded host mode, although there is a series of interrelated scripts that will permit host operation. The program doesn't do an automatic dialback, but programming it to do so would not be that difficult. Considering how attractive the rest of the program is, it would be a shame if the need for an automatic host mode was all that stood between you and *Qmodem*.—**Merv Adrian**



In Relay Silver, *as well as in* Gold, *details specific to every entry in the directory are stored on a separate options page. Explanatory screens for each parameter are available at the push of a button, and a log-on script to automate a given communications session may be indicated.*

Relay Gold
Relay Silver

Relay Gold and *Relay Silver*, Editor's Choices in previous *PC Magazine* communications software reviews, go far beyond the conventional terminal emulation and file transfer capabilities of most commercial products.

Produced by VM Personal Computing, *Relay Gold* and *Silver* possess the same core. However, besides handling an array of PC-to-PC communications functions, *Relay Gold* can work together with proprietary mainframe software to allow file transfer between PCs and large mainframes. *Gold* allows 3270 terminal emulation in software or through its support of PC emulation boards, while *Silver* is aimed at users who do not need the specialized mainframe abilities of *Relay Gold*. The two programs are identical in every other respect, and all the features described here pertain to both. *Gold* lists for $250, while *Silver* costs $150.

Both possess multitasking features that allow file transfer, text editing, and printing activities to be conducted simultaneously. The rich scripting language common to both programs allows automated control of all aspects of communications.

Don't think, however, that these advanced features mean complex tasks and bumpy learning curves for the user. Both programs present a clear, consistent menu-driven user interface that beginners can use with a minimum of training. Context-sensitive help is a keystroke away, and the products are preconfigured to handle most popular modems and on-line services.

The tutorial simulates almost every phase of *Relay* operation and is an excellent introduction to its use. Another program makes installation and configuration of *Relay* practically painless. A surprisingly complete Getting Started booklet takes the new user through the necessary steps.

Computers with which *Relay* may communicate are listed in a directory that contains phone numbers, terminal types, bit-per-second rates, and comments. For each entry in the directory, one may also specify a full range of protocol and handshaking particulars, details on remapping the keyboard, and a script that will automatically handle all log-on procedures.

Relay comes with a directory of computers that is preloaded with many common configurations. Sample entries are supplied for commercial services such as CompuServe and Dow Jones News/Retrieval, for common bulletin board systems like RBBS and FIDO, and for generic TTY and mainframe links. *Relay* has its own proprietary protocol for use between any two PCs running versions of *Relay*. This allows groups of files to be specified for transfer using the DOS wildcard characters, and the machines can both send and receive files simultaneously. Furthermore, users at each PC can chat from the keyboard during file transfer.

The log-on script for each entry in the directory may be created using the com-

To some people, the difference is obvious.

© 1988, Informix Software, Inc. SmartWare, Xenix and Unix are registered marks of Informix Software, Microsoft and AT&T respectively.

"For sheer power, ease of use, speed, and flexibility, you would be hard-pressed to find a more capable product, especially if you need advanced features. It works just as well with a half-dozen spreadsheets simultaneously as it does with one."
—InfoWorld

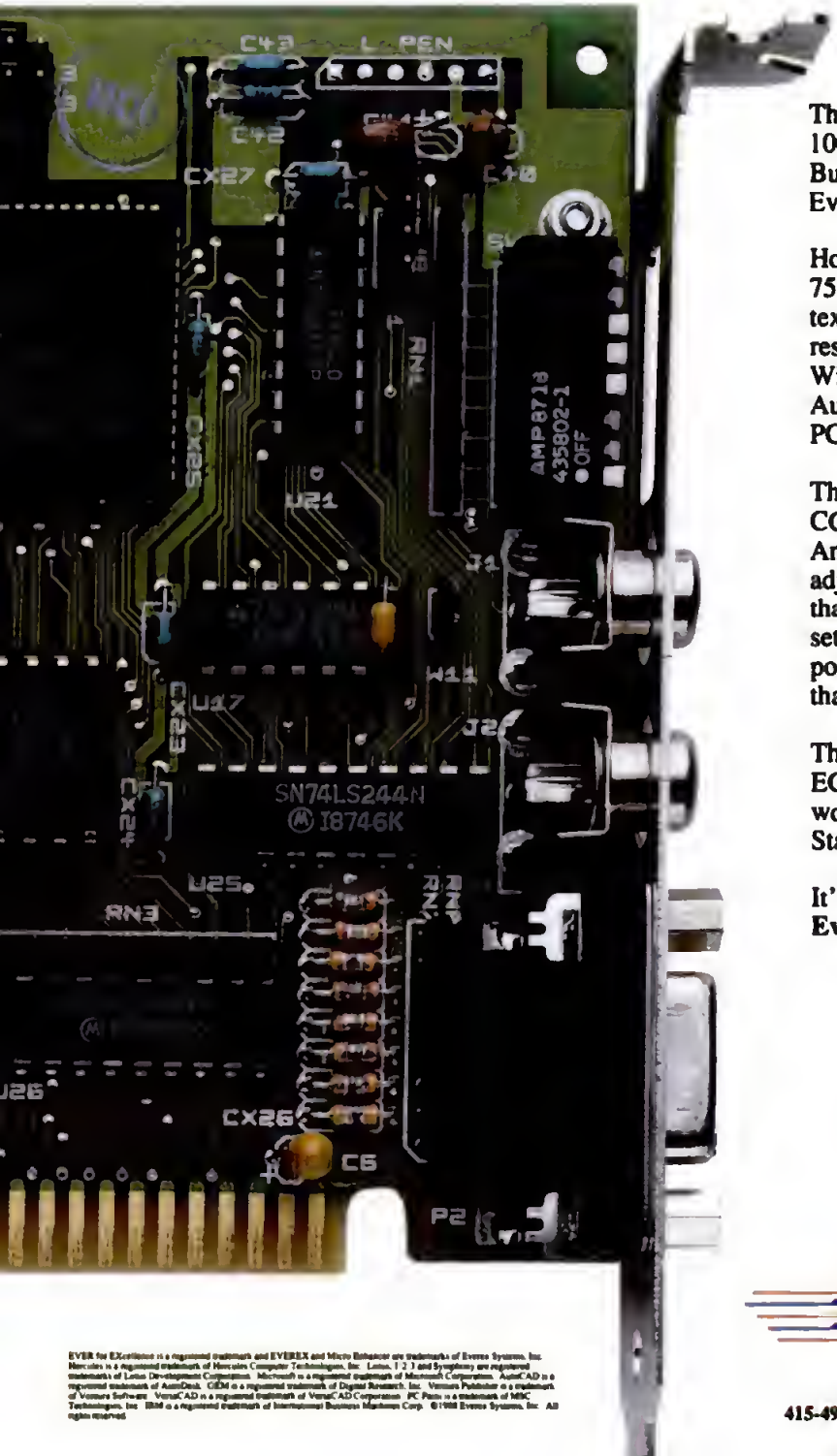
PC MAGAZINE EDITOR'S CHOICE

"Integrated systems have come a long way, and Smart has...the widest array of powerful features...strong points include intelligent data sharing and good file security, intuitive ease of use, a powerful programming language, and consistently good performance...Smart can fill the bill for a total, integrated software system."
—PC Magazine

Whether you're just getting started as a lone computer user, or you're the Manager of Information Systems supporting thousands of PC users, discover easy-to-use applications your office won't outgrow. Single user and Multi-user software for DOS, LANs, UNIX or XENIX systems: Word Processing, Spreadsheet & Graphics, Database Management and Communications. For additional information, including a Free Smart Demo, simply return the reply card or call toll-free (800) 331-1763. In Kansas or Alaska call (913) 492-3800, in Canada call (800) 233-6905.

SmartWare®
from Informix Software

More Board for the Buck



That's what the EGA game comes down to. 100% IBM® EGA compatibility is essential. But today you need more. So what does the Everex Micro Enhancer deliver?

How about extended EGA resolutions like 752 x 410 and 640 x 480, and 132 column text modes. Or the ability to use those resolutions while running Microsoft® Windows, Lotus 1-2-3,® Symphony,® AutoCAD,® GEM,® Ventura Publisher,™ PC Paint™ and VersaCAD®.

That's nice. But what if your Hercules® and CGA applications ran on an EGA monitor. And if an autoswitch feature automatically adjusted modes to the software running, so that you wouldn't have to hassle with switch settings. Or if there was an optional parallel port to save money and space. Wouldn't that be better?

This all comes from a leading supplier of EGA cards and costs so little that you wouldn't believe it's made in the United States. That's more board for your buck.

It's simple. More features for less money. **Everex has the answer.**

For more information or the name of your nearest Everex dealer please call:

in USA **1-800-821-0806**

in Calif. **1-800-821-0807**

CIRCLE 159 ON READER SERVICE CARD

EVEREX

EVER for EXcellence®

415-498-1111 **48431 Milmont Drive, Fremont, CA 94538**

EVER for EXcellence is a registered trademark and EVEREX and Micro Enhancer are trademarks of Everex Systems, Inc. Hercules is a registered trademark of Hercules Computer Technologies, Inc. Lotus, 1-2-3 and Symphony are registered trademarks of Lotus Development Corporation. Microsoft is a registered trademark of Microsoft Corporation. AutoCAD is a registered trademark of AutoDesk. GEM is a registered trademark of Digital Research, Inc. Ventura Publisher is a trademark of Ventura Software. VersaCAD is a registered trademark of VersaCAD Corporation. PC Paint is a trademark of MSC Technologies, Inc. IBM is a registered trademark of International Business Machines Corp. ©1988 Everex Systems, Inc. All rights reserved.

mands described in the *Relay* reference guide, but a much faster way is to use the learn facility that comes with the program. A typical log-on session is recorded by *Relay* and saved as a script to be used on all subsequent calls to the same computer.

SOPHISTICATED EDITOR *Relay* makes it very easy to alter or fine-tune a log-on script. A sophisticated full-screen text editor may be used to edit scripts or any other DOS ASCII file. The editor can perform conventional block operations and has wildcard search-and-replace capabilities. Several files may be opened simultaneously for editing, and the editor may be used while *Relay* is on-line and transferring files to another computer.

The commands used in a typical log-on script are only a subset of those available to the user. *Relay*'s script language offers an extensive set of tools for handling the real-time factors inherent in data communications. As with many high-level languages, the basic programming elements consist of variables, functions, and commands.

System variables available to the pro-

PC MAGAZINE FACT FILE

VM Personal Computing Inc.
41 Kenosia Ave.
Danbury, CT 06810
(800) 84-RELAY
(203) 798-3800

***Relay Gold*, Version 2.0**
List Price: $250
Requires: 192K RAM, two disk drives, DOS 2.0 or later.

CIRCLE 684 ON READER SERVICE CARD

***Relay Silver*, Version 1.0**
List Price: $150
Requires: 192K RAM, two disk drives, DOS 2.0 or later.
In Short: Identical except for *Relay Gold*'s micro-to-mainframe links, these programs combine conventional terminal emulation and file transfer abilities with multitasking and text-editing features. Sophisticated but friendly to novices. Not copy protected.

CIRCLE 683 ON READER SERVICE CARD

I KNOW THAT REPORT IS IN HERE SOMEWHERE.

And GOfer is just the one to track it down. On a standard PC/AT, GOfer digs through files at a speed of over 1 Megabyte per minute. Most GOfer users find the information they need in less than 30 seconds.

A phrase, a fact, a note, a date. If you need it, GOfer finds it.

Even among countless PC files, GOfer software searches out the information you need with just one or two words, even if the correct spelling slips your mind.

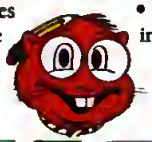
"The most exciting and essential add-on since Sidekick. A must for anyone who writes anything," says Tim Bajarin, columnist and commentator.

Unlike other text-retrieval software, you won't spend hours indexing or converting files before you can start searching. Four simple keystrokes and GOfer searches floppy and hard disks to uncover the text you need.

Once GOfer finds a section of text, you can print it, create a new file, or copy and paste into the document you're currently working in.

So if you need a certain document written to Bill Smith that mentions "insurance" and "third quarter profits," just summon GOfer with one keystroke and give him the word. Within seconds, that document will be at your fingertips.

- Not copy protected
- Performs complex searches using AND/OR/NOT and NEARBY
- Optional file compression feature allows you to fit more information on a hard disk. GOfer will search both compressed and non-compressed files.
- Works with other RAM resident programs
- Finds text in almost any PC file including Lotus, WordPerfect, WordStar, DisplayWrite, Microsoft Word, MultiMate, Ventura, PageMaker and dBase



GOfer™

GOfer is available at quality software retailers.

800-828-6293 STE #544

Microlytics, Inc. (716) 377-0130 in New York State
Software products and services
Microlytics, Inc., 300 Main Street, Suite East Rochester, NY 14445

No risk 30 day money back guarantee
IBM PC Compatible ☐ 5¼" disk ☐ 3½" disk
GOfer is also available for the Macintosh

☐ Visa ☐ MasterCard ☐ American Express ☐ Discover
Card Number _____ Exp. Date _____
☐ Check ☐ COD (add $2.20)
NAME _____
COMPANY _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
PHONE _____

$79.95 each. Please add shipping charges and sales tax, if applicable.
Shipping $3.75 (in Canada $4.75). Shipping outside U.S. and Canada $12.

New York residents add applicable sales tax. GOfer™ is the Text Finder™ utility from Microlytics™. GOfer, Text Finder and Microlytics are trademarks of Microlytics, Inc. Other brand and product-names are trademarks or registered trademarks of their respective holders.
© 1988, Microlytics, Inc. All rights reserved.

CIRCLE 526 ON READER SERVICE CARD

Enable 2.0 can do more for your business than the other five combined.

"Enable may legitimately claim to be the only package you'll ever need."

Computer Buyer's Guide & Handbook

Five major business tools, Word Processing, Spreadsheet, Graphics, Database Management and Telecommunications: all in one full-featured, easy to learn, cost-effective package. With the ability to share data across applications that no group of stand-alones can match. And now, with newly-enhanced version 2.0, *PC Week* has named Enable "best integrated software package on the market."

Its remarkable ability to handle a virtually unlimited range of tasks has already made Enable one of the leading software suppliers to the Federal Government and Corporations large and small.

"If you are looking for one program to do it all, this is the one."

PC Magazine

If you're stepping up to a Local Area Network, new Enable/LAN just came out on top in a comparison with other integrated LANs in an *InfoWorld* report: "easier to learn and use... the best integration ...(Enable) simply feels right."

Enable 2.0 and Enable/LAN. Everything you need to unify, simplify and strengthen the operation of your business. For now, and for the growth to come.

For more information, plus the name of your nearest Enable dealer, just dial 1-800-634-3470. New York: 1-800-551-1004. Canada: 613-727-5040. Please ask for Department M.

Consider Enable's $695 versus their nearly $2500. How does that compute?

See Us At PC EXPO, Booth #525

enable
integration without compromise

©1987 The Software Group, Dept. M, Northway Ten Executive Park, Ballston Lake N.Y. 12019

CIRCLE 363 ON READER SERVICE CARD

grammer include things like current date and time, line quality, and DOS file identifiers for files being manipulated by *Relay* at any given moment. Functions perform simple calculations, handle string manipulation, and supply certain kinds of hardware information. A variety of date and time conversion functions are also included in the program.

Script-language commands initiate various *Relay* activities and handle branching based on certain conditions. Commands can display messages on the user's screen and can pause for keyboard response. They are used for dialing and answering calls, as well as exchanging messages and files with other computers.

Status information on the success or failure of a command is reported, and a script may respond appropriately, using the familar if-then-else construct. Commands such as On Error and On Disconnect, which tell the program what to do if it detects an error or a disconnect message, are set to poll for specific conditions at all times. Any script can transfer control to another, and GOTO and GOSUB commands may be used to branch within a script.

DOS programs or commands may be run from within a *Relay* script. Programs run concurrently with any printing or file transfer that may be going on. The *Relay* editor may also be accessed by scripts, so files can be downloaded, processed in the editor (sorted, for instance), and then saved to disk. *Relay*'s impressive concurrent capabilities are always available no matter whether a script is running.

■ If what you need is a comprehensive, powerful program, you'll delight in *Relay*'s many options.

PASSWORD PROTECTION *Relay* may be set to receive calls from other computers running a version of *Relay*. Remote file transfers can take place with the sending computer transferring a file to an unattended receiving computer. The caller may perform most DOS functions and even run programs on the remote machine, though the display output is not echoed to the calling computer. Three types of password protection are available to prevent unauthorized access to the host PC.

If you need a comprehensive, powerful communications program, you'll delight in the many options *Relay* puts at your disposal.—**David L. Hoffman**

Respond/Async

Menu lovers will fall head over heels for Software Synergy's *Respond/Async*. Priced at $129, it tries to please everyone—from beginners to programmers. Its Quick Start mode lets beginners use a few keystokes to connect to on-line services. Programmers will like the program's script language: it lets you write a series of program components, called dialogues, that you can save in command libraries to automate communications.

The program takes up about 500K of disk space, but you can reduce its bulk by deleting unwanted terminal emulation files. The 33-page Quick Start manual takes you through installation, start-up, communications profile configuration, and hookup quickly and fairly clearly. The manual has no tutorial, but introductory sections walk you through the usual operations. On-line help is available.

HEAVY ON MENUS *Respond/Async* is entirely menu-driven. Using what Software Synergy calls *Xpress* keys, you can jump to the program's major function screens. You can exit to DOS without breaking communications and run other programs from *Respond/Async* by defining "program profiles." Menu-weary users can write dialogues to automate command sequences or type successive menu commands quickly to move through the screens without pausing.

There is an Unattended mode through which you can set up your machine so that you or anyone else who supplies the specified password can operate it from a remote location.

Respond/Async's terminal emulation shines. In defining a terminal profile, you can select from screens of options that use

Respond/Async*'s script language uses dialogues, or program components, to automate command sequences; the above dialogue contains commands for signing on to MCI Mail. Stored in a library, a dialogue can include up to 13 lines of commands.*

How to pick th

Good instincts run in this family (left to right): the new LOGITECH HiREZ Mouse ($179), the only mouse designed expressly for high-res screens; the LOGITECH Series 2 Mouse for the IBM PS/2 ($99, plugs right into mouse port); and the LOGITECH Mouse for standard screens ($119, in bus and serial versions). All come with Logitech's own Plus Software, which assures ease of use with virtually any software, mouse-based or not.

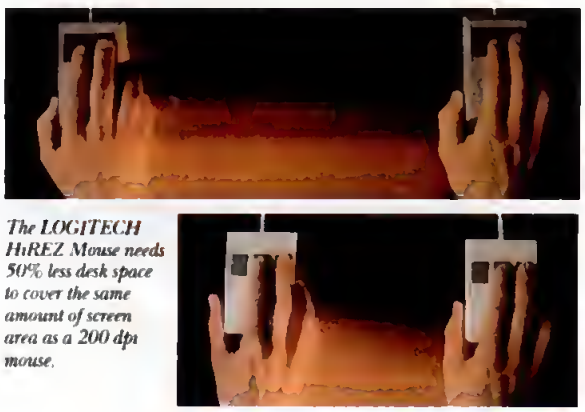
Though most mice out there look pretty much alike, they're not all equal in performance. It pays to be just a little choosy to make sure you end up with the right mouse for your needs.

Starting with software. If you want full compatibility with all of your software, all you have to do is look for a mouse with the Logitech name. There are four in all, each one designed for different hardware needs.

THE HiREZ MOUSE

If you've got your eyes on a high-resolution screen, the mouse to get your hand on is the new LOGITECH HiREZ Mouse.

With a resolution of 320 dots-per-inch (as compared with 200 dpi or less for ordinary mice), it covers the same area on your high-res screen but needs less of your desk to do it. More than 50% less. Saving you valuable desk space, and effort: mouse maneuvers that used to require sweeps of the hand are now reduced to a flick of the wrist.



The LOGITECH HiREZ Mouse needs 50% less desk space to cover the same amount of screen area as a 200 dpi mouse.

Which makes this new mouse a hand's best friend. And a more reliable, long-lasting companion. And, like all Logitech mice, it's fully compatible with all popular software, and equipped with a Lifetime Guarantee.

THE SERIES 2 MOUSE

For those who've chosen the Personal System/2,™ the most logical choice is the LOGITECH Series 2 Mouse. It's 100% compatible with PS/2, and plugs right into the mouse port, leaving the serial port free to accommodate other peripherals.

e right mouse.

THE ALL-PURPOSE MOUSE: SERIAL OR BUS

Most people find our standard mouse is still the best choice for their systems. It's available in both bus and serial versions, one of which is sure to fit perfectly with your hardware. And with all your favorite software—whether mouse-based or not.

It's hardly an accident that only Logitech offers you such a complete selection—we're the only mouse company to design and manufacture our own products. We make more mice, in fact, than anyone else. Including custom-designed models for OEMs like AT&T, DEC, and Hewlett-Packard.

The three mice pictured to the left come with all this expertise built right in. Which explains an interesting paradox: while you may pay less for a Logitech mouse, you'll surely get more in performance.

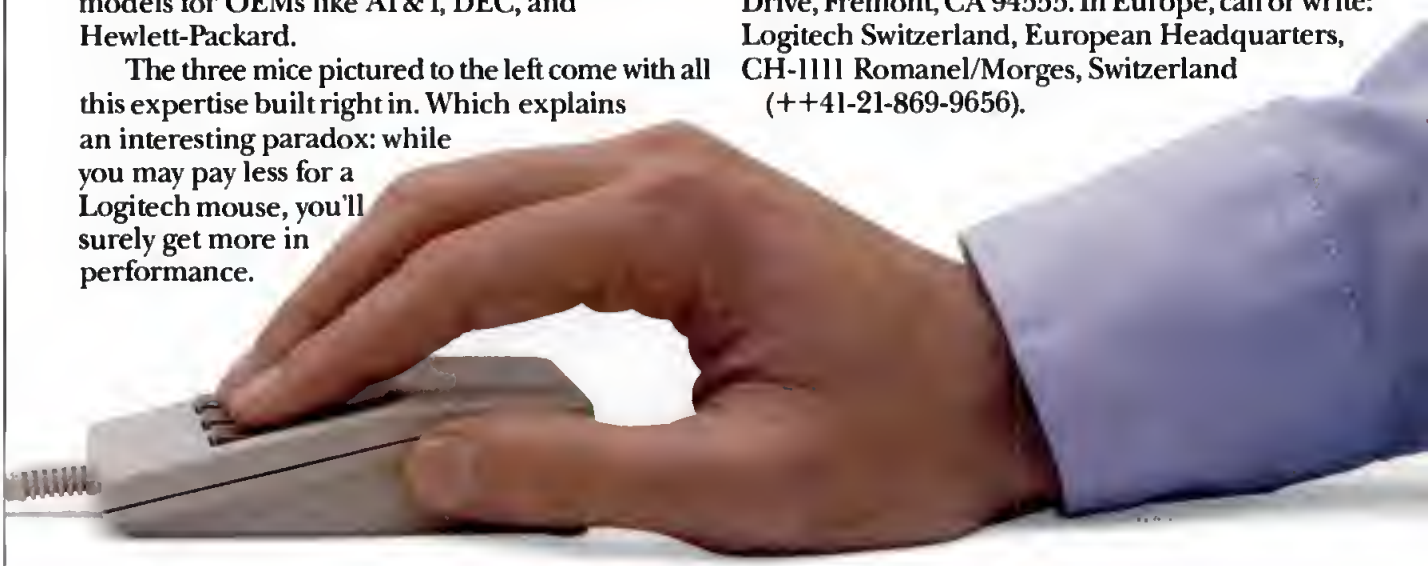
A Logitech mouse plus Logitech application software equals a complete solution (all prices include mouse, Plus Software, and application):

LOGICADD...$189. Turns your PC into a full-featured CADD workstation. Everything you need for dimensioned line drawing and CADD.

PUBLISHER PACKAGE ...$179. PUBLISHER software lets beginners and experts alike produce professional, high-impact documents. Design templates make page layout easy.

LOGIPAINT SET... $149. Eleven type fonts and a 16-color palette. Creates files that move easily into both LOGICADD and PUBLISHER documents.

(**800-552-8885** in California). Or fill out and mail the coupon below to: Logitech, Inc., 6505 Kaiser Drive, Fremont, CA 94555. In Europe, call or write: Logitech Switzerland, European Headquarters, CH-1111 Romanel/Morges, Switzerland (++41-21-869-9656).



And in comfort. With a unique lightweight ergonomic design. Low-angled buttons for maximum comfort and minimum fatigue. An exclusive technology that guarantees a much greater life span. An exceptionally smooth-moving, dirt-resistant roller ball. And natural compatibility with all PCs, look-a-likes, and virtually any software.

All of which leads to an inescapable conclusion: if you want to end up with the right mouse, start with the right mouse company.

Logitech. We've got a mouse for whatever the task at hand.

For the dealer nearest you, call **800-231-7717**

Logitech, Inc., 6505 Kaiser Drive, Fremont, CA 94555.
Logitech Switzerland, European Headquarters,
CH-1111 Romanel/Morges, Switzerland.

Yes! Please send me the name of the nearest Logitech dealer.

Name _____

Company/Title _____

Address _____

Phone _____

LOGITECH

Personal System/2 is a trademark of International Business Machines, Corporation.

CIRCLE 133 ON READER SERVICE CARD

PC MAGAZINE FACT FILE

***Respond/Async*, Version 4.19**
Software Synergy Inc.
641 Avenue of the Americas
New York, NY 10011
(212) 645-9663
List Price: $129
Requires: 256K RAM, DOS 2.0 or later.
In Short: A menu-driven program with a Quick Start feature that eases operations for beginners. Menus can become tedious, and circumventing them requires work. The script language works with other features to give total control over communications processes. Not copy protected.

CIRCLE 671 ON READER SERVICE CARD

the same definitions as those used in the emulated terminal's documentation. The advantage is that the terminology is familiar to people who use the specific terminals supported.

Respond/Async also offers complete emulation of the terminals it supports. Terminal emulation is less important for those who communicate only with other PCs or with major on-line services, but it's crucial for users who need to connect with computers or services that require specific terminals.

SCRIPT DIALOGUES Components of *Respond/Async*'s script language are called libraries and dialogues. A dialogue consists of up to 13 lines of commands. Dialogues are stored in libraries, with each library containing as many as 25 dialogues. You can create and save a total of 25 libraries. To create and edit dialogues, you must use *Respond/Async*, not another editor. *Respond/Async*'s dialogue commands can control variables, video display, data input and output, communications lines, telephone support, dialogue command flow, and error processing. Dialogues can call each other, and you can also chain them together.

Once you are familiar with using *Respond/Async*, its distinctive terminology may become second nature, but to novice users the program's references to libraries, directories, dialogues, and various types of profiles can be confusing.

Respond/Async is easy to use but has plenty of power features for advanced users.—**Bruce Brown**

SideTalk

Lattice's *SideTalk* is a $119 programmable communications program that can operate in the background or foreground. While basic operations are fairly straightforward, the program's script language, SideTalk Command Language (SCL), is a high-level language that facilitates powerful and fancy procedures. It's easy to create pop-up menus that include choices for command-driven functions.

To load the program on a hard disk, you put the system distribution disk or a backup in drive A:, make it the current drive, and type LOADST C:. *SideTalk* creates its own subdirectory on your hard disk, \ST, and copies all necessary files into it. You can use *SideTalk* with a floppy-disk-only system, but a hard disk drive is recommended if you're going to use the program in its RAM-resident, background mode. It works with any modem with a configuration file written with SCL. The default configuration works for modems that are fully Hayes compatible.

In addition to a 52-page user manual, the documentation includes more than 100 pages of appendixes, most of which provide excellent descriptions of the SCL commands—including a definition of the syntax and all option flags, a complete description of the command operation and flags, one or more appropriate examples, and a "See Also" cross-reference to other relevant commands or chapters in the manual. It's easy to find what you need without being overwhelmed by lengthy, convoluted explanations.

There is no tutorial. Users who turn to this program should be just a notch above novice status. And for them the excellent program design and clear manual make the need for a tutorial program redundant.

Support is abundant. In addition to their customer support department, Lattice maintains an electronic bulletin board where you will find tips on using the program, public domain software you can download, and a forum through which you can chat with Lattice staff or with other users. Although there is a predefined phone

SideTalk's initial screen displays a status line and several Alt-key commands you can use while in terminal mode. F10 invokes the pop-up menu that helps you set parameters, build a phone directory, and make calls.

If You Could Input Anything Into Your Computer Instantly, Without Using The Keyboard, Would It Make Your Life Easier?

Introducing DeskScan 2000. The affordable scanner from Chinon.

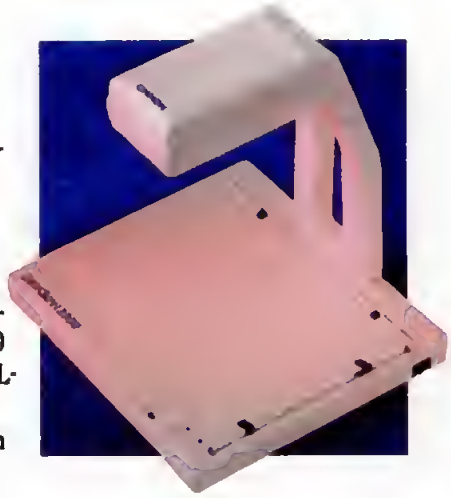
Chinon's unique new scanner could change forever the way you use your computer. With OCR software, it scans, digitizes and inputs text into your computer so that you can edit it with almost any word processing software. That means no more retyping of documents. Just think how much time that could save you and your staff!

DeskScan 2000 also scans images, so that you can input graphics too. Then you can manipulate these images with desktop publishing or graphics software.

Best of all, DeskScan 2000 is much lower priced than most effective scanners. That means it's finally cost-effective to put a scanner on every PC user's desk.

DeskScan's unique overhead scanning design means that you no longer have to separate pages from documents to feed them through a scanner. The document stays still while the scanning head *"reads"* the page. And the unit automatically adjusts for room lighting levels.

Scanners aren't just for desktop publishing any more. DeskScan 2000 becomes an economical FAX, with the simple addition of an inexpensive add-in board. Chinon sells this exciting option and others in package combinations of bundled hardware and software—so that you have an affordable way of getting started with your scanner right away.



So see for yourself what DeskScan 2000 can do for you. Call TOLL-FREE 1-800-441-0222 TODAY for the DeskScan 2000 dealer nearest you.

CHINON

Chinon America, Inc., 660 Maple Ave., Torrance, CA 90503

CIRCLE 318 ON READER SERVICE CARD

PC MAGAZINE FACT FILE

***SideTalk*, Version 1.0**
Lattice Inc.
2500 S. Highland Ave.
Lombard, IL 60148
(800) 533-3577
(312) 916-1600
List Price: $119.95
Requires: 128K RAM, two disk drives (hard disk recommended), DOS 2.0 or later.
In Short: Able to run in the background and transfer files while other DOS applications are running, *SideTalk* gets high marks for raw power. Though not the best for novices, it has a complete script programming language and lets DP managers easily develop user menus. Not copy protected.

CIRCLE 682 ON READER SERVICE CARD

directory listing in *SideTalk* for the LATTICE-BBS, the company has moved and the phone number is no longer valid. The new address and phone numbers are included on an announcement in the manual, and you can edit the LATTICE BBS listing in the phone directory.

SideTalk uses function keys, single-key-selection menus, Alt-key combinations, "point-and-shoot" menus, and a plain command line. It would be easy to lose control with such a multifaceted design, but Lattice kept it together. You will not find menus for every possible function, just the simpler ones. When you master the program and want to work faster, you can go to the command line (Alt-C) and type commands directly. Once you decide it's time to customize the system or to set up some fancy procedures, then you enter a programmer's world and use SCL.

You use the "ST" command to load *SideTalk* into RAM-resident mode and "ST/N" to run it as a standalone product. The program comes up in terminal mode, so you can type directly to the modem at that point. A list of Alt-key commands, resembling a menu, is displayed on the screen.

BACKGROUND POWER You can use most any program when *SideTalk* is operating in the background. Some activities, such as a long recalculation in a spreadsheet, might suspend *SideTalk's* activities, however. When *SideTalk* finishes downloading a file in the background, it beeps several times. At that point you can call the program up, issue more commands, or go off-line.

Lattice is best known for its C compilers, and the SideTalk Command Language doesn't disappoint. It provides a powerful set of commands that allow you to automate any communications process. The more-advanced uses of SCL will need an editor to create a command file. Unfortunately one is not provided.

SCL command files can be as simple as lists of acceptable *SideTalk* commands, similar to a DOS batch file. But with labels for subroutines, SCL files can use conditionals and be programmed to wait for specific times to carry out tasks independently. You can also use the SCL language to develop new menu systems. The language includes variables, string handling, error handling, file control (up to three files open at once), input and output commands, arithmetic functions, program flow control, and window operations.

SideTalk does simple tasks easily, but there are other, lower-end products that are cheaper and easier. *SideTalk* stands out for the power users who want to roll their own. For $119.95, they can't go wrong; *SideTalk* delivers without overwhelming.—**Bruce Brown**

Smartcom III

Hayes Microcomputer Products, leader in the modem market, has introduced a new communications program, *Smartcom III*. This $249 program is more than an upgrade of Hayes's earlier *Smartcom II* communications software, which is still available. Unlike *Smartcom II*, which has different error-correcting protocols, a different user interface, and no script language, *Smartcom III* is very versatile.

Smartcom III requires FILES=20 on your CONFIG.SYS file. It seeks confirmation from you, however, before automatically creating or modifying your CONFIG.SYS file.

The program is set to work with Hayes modems—either the older style or the new V-Series. There are no provisions to modify modem setup or initialization strings. Since it knows how to configure Hayes modems, there's no discussion of DTR, CD, and other RS-232 lines. *Smartcom III* will work with a three-line connection, but it can make use of more-complex connections if available. Setting the duration of the dialing tones and enabling the V-Series hardware error checking is about all the adjustments you will have to make. If you have a Hayes modem, there's no problem, but the program isn't guaranteed to work with anything else. So-called Hayes compatibility in other modems can be something less than total.

EDITOR'S CHOICE

PC MAGAZINE FACT FILE

***Smartcom III*, Version 1.0b**
Hayes Microcomputer Products Inc.
705 Westech Dr.
Norcross, GA 30092
(404) 441-1617
List Price: $249
Requires: 512K RAM (640K recommended); two 720K floppy disk drives (hard disk strongly recommended); DOS 2.0 or later
In Short: *Smartcom III* is designed for the new generation of machines. Although its high RAM and disk memory requirements make it the wrong choice for a floppy disk system, power users looking for an easy-to-use yet extremely sophisticated program will find it offers both. Not copy protected.

CIRCLE 681 ON READER SERVICE CARD

DIFFERENT TERMINOLOGY *Smartcom III* uses unique terminology. The settings that define the nature of the contact are called Activities and Connections. Activities settings control such elements as the screen display and printer setup, how files are to be transferred, execution of scripts, and the like. Connections settings adjust such functions as bit-per-second rate, direct versus modem connections, modem control settings, and so on.

Generally, you first create an Activity for each service, bulletin board, or other computer system with which you communicate, then choose which Connection you want to use. A variety of activities and connections are included.

IN OUR FAMILY ONE GOT THE LOOKS,

ONE GOT THE BRAINS,

ONE GOT THE DRIVE.

Fortunately, they all inherited the genius of Sony.

The new CPD-1303 Multiscan™ Monitor is the inspired offspring of the CPD-1302 monitor. While the CPD-1303 is less expensive, it still leads the way in variable frequency monitors. Boasting a Sony Trinitron® Microblack® Screen, a resolution of 800H x 600V and total Multiscan-VGA compatibility.

Of course, being a closely knit family, we also share a lot of great memories. Thanks to our CD ROM with a large 640MB capacity memory.

And what's the driving force behind our family? Why, our innovative Sony Disk Drive. Brought to you by the same people who invented the 3.5 inch disk drive. Only now you can add this standard technology to your existing system, and take advantage of the latest software formats available.

For more information call 1-800-222-0878. Because being the loyal family that we are, we'll continue to deliver some of the highest quality, most reliable computer peripherals around.

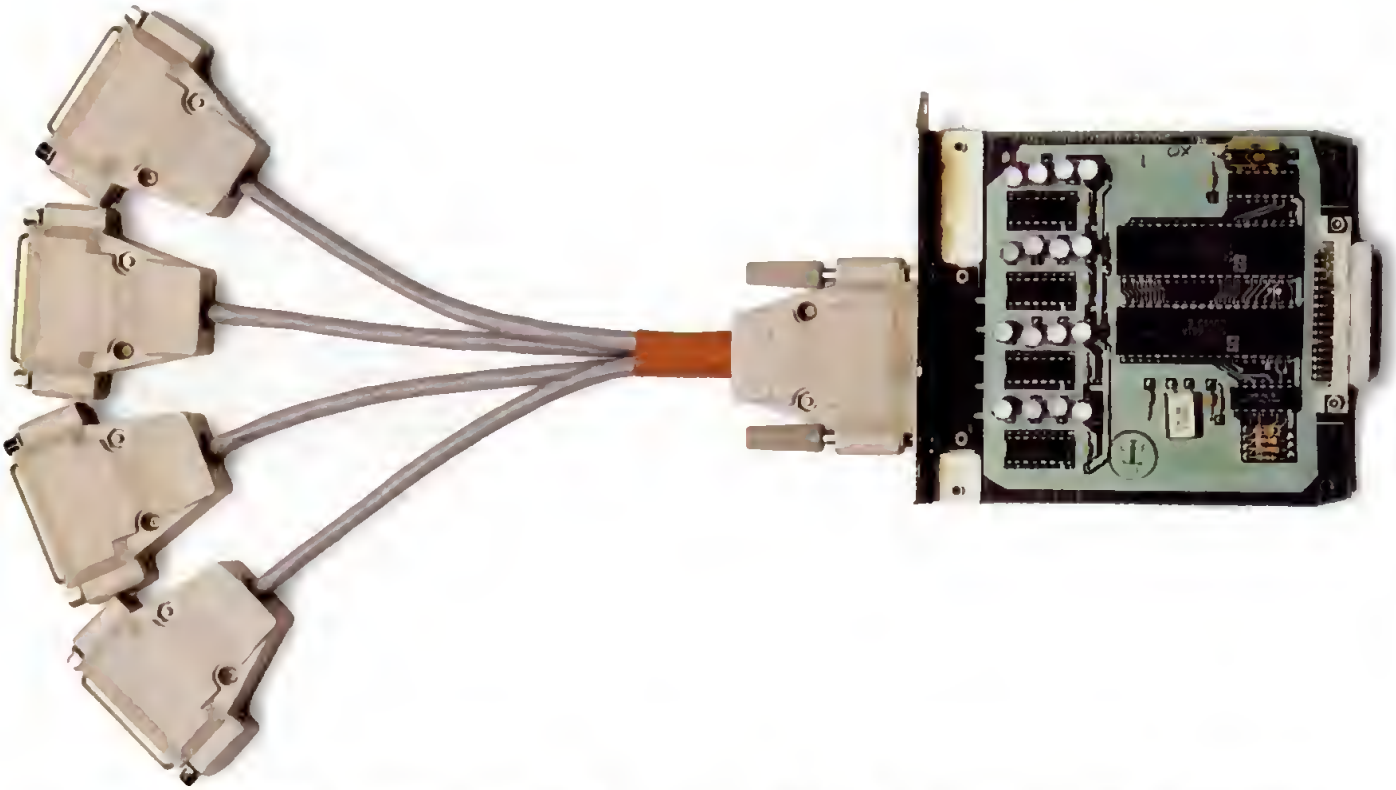
Sony Computer Peripherals

SONY.
THE ONE AND ONLY.

For More Information Call: Intelligent Products Marketing, CA (415) 866-8620; Intratec CA (714) 474-8740; Roy J. O'Donnell Company, CO (303) 778-7575; Galaxy Sales Corporation, FL (305) 620-7677; G/B Marketing Inc., IL (312) 520-4008; CP Marketing, Inc., MA (617) 969-1152; E. L. Horn & Associates, MD (301) 230-1411 (215) 372-5691; Jay F. Schude Associates, MI (313) 665-6222; Herold Marketing Associates, MN (612) 944-1121; Smartstuff, MO (314) 532-6133; Computer Marketing Group, NJ (201) 947-3551; Better Sales & Marketing, NY (716) 385-7954, (518) 786-1780; Techcom, OH (614) 436-7676; BSA Sales, SC (803) 297-7020; Miller & Associates Computer Products, Inc., TX (214) 437-5733; Hooker Northwest, WA (206) 643-1820

© 1988 Sony Corporation of America. Sony, Trinitron, Multiscan, Microblack, and The One and Only are trademarks of Sony. Bookshelf is a trademark of Microsoft Corp. Actual monitor graphics generated by RIX EGA PAINT 2005. These products are not manufactured to any specific software and Sony does not and cannot make any warranty or representation with respect to the performance of the products with respect to any particular software packages and/or non-Sony add-on hardware options. Sony hereby disclaims any representations or warranty that the monitors are compatible with any combination of non-Sony products you may choose to connect. Purchaser must determine for himself the suitability and compatibility of the hardware and software in each instance.

CIRCLE 271 ON READER SERVICE CARD



NOW YOU CAN CONNECT FOUR USERS TO ONE LASER PRINTER.

With the Mannesmann Tally® MT910 Laser Printer and its Multiuser Interface option, you can connect four users for just $1050 each.

Each of you will have your own I/O port, programmable for your own protocol and emulation. Laser-crisp text and graphics at 300 dpi. All the specs you see in the center. And with an optional 5-bin sorter, even your own output bin.

THIS ONE.

- Speed: 10 pages-per-minute
- Dual paper cassettes standard, 250 sheets each.
- Dual output bins standard, 250 sheets each.
- Memory: 500K; 400K available to print graphics or download additional fonts.
- Manual feed handles single sheets, envelopes, transparencies, and labels.
- Emulations: Diablo® 630, Epson® FX, IBM® Proprinter,™ HP® LaserJet Plus,™ and Qume® Sprint II.
- Workload: 10,000 pages per month.
- Standard fonts: ☐ Courier 10. ☐ Prestige Elite 12 ☐ Letter Gothic 10.6 ☐ bold, italic, condensed, and expanded.
- Options: ☐ 4 user I/O ☐ extensive library of optional fonts in cartridge or downloadable formats ☐ 1.5 Mg RAM upgrade ☐ 5 bin sorter.

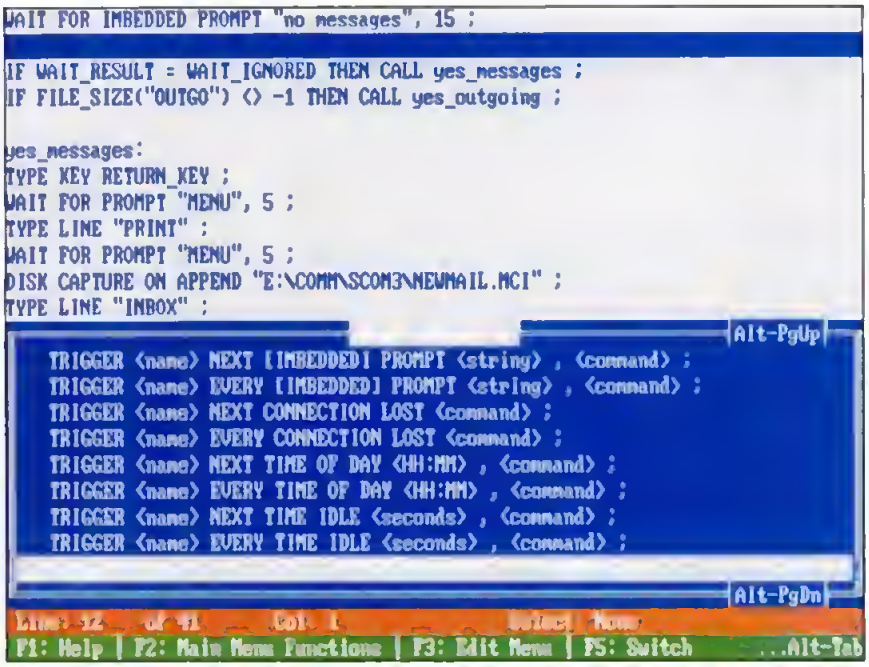
CIRCLE 224 ON READER SERVICE CARD

So call the number below for more information or to connect with your nearest dealer.

And he'll connect you with the only out-of-the-box laser printer on the market today that gives you so much for just $1050 per user.

A Mannesmann Tally.

MANNESMANN
TALLY
1-800-843-1347



Smartcom III*'s split-screen editor lets you enter long commands into scripts by pointing and choosing. This process, which indicates where to place prompt messages and variable names or filenames, saves time and reduces typing errors.*

Smartcom III's user interface is completely textual but intuitive and logical. You don't miss the graphics at all. It uses a combination of menu styles and window frames suitable to communications.

USING THE LANGUAGE There is a comprehensive, well-written, context-sensitive help system. Moreover, *Smartcom III* has a fine text editor that you can use for composing messages or for writing scripts.

When you write scripts, a window appears that contains all the language's statements. It lists the statements alphabetically or in functional order, according to your choice. When you select one, it appears in your script and indicates where you need to place prompt messages, variable names or filenames, and the like. This cuts down on typing and reduces errors.

Smartcom III's SCOPE (Simple COmmunication Programming Environment) language is powerful, flexible, and reasonably easy to learn. The language is not as structured as modern BASICs, so you have to use lots of GOTOs to control program flow, and the syntax is rather wordy. Scripts are compiled for faster execution; the compiler checks for errors, inserts descriptive error messages, and returns you to the editor if necessary—an excellent and helpful system. SCOPE is unquestionably potent and could be used to program a bulletin board system or even games.

Smartcom III supports various permutations of Xmodem, Ymodem, and Kermit file protocols. Interestingly, Hayes's own Verification protocol introduced in *Smartcom II* is not supported (Hayes felt that the 1K-block Ymodem protocols outperformed the 512-byte Verification protocol). The CompuServe-B protocol isn't supported either—a disappointment to fans of that popular service.

SCRIPTS FOR REMOTE *Smartcom III* supplies a script for remote file transfer. Basically, this is a simple BBS that gives you the ability to download or upload files with Xmodem, Xmodem (checksum), Xmodem 1K, Ymodem-G, or Kermit. The script also requires the equivalent of many DOS commands, but you cannot execute programs on the remote system. The script includes password protection, though you might want to add multiple password levels. If you prefer, you can simply use the Kermit screen to manage file transfers, with the remote computer acting as a Kermit master.

Smartcom III does allow you to drop to DOS locally while maintaining your connection, enabling, say, a long download to continue in the background. Hayes categorizes this feature as "undocumented" and discusses it only in a READ.ME file on-disk. The company warns of possible incompatibilities, and you may have to adjust some environment variables to juggle memory allocation, but it worked well in our tests.

Smartcom III's panoply of features takes a heavy toll on system memory. *Smartcom III* requires 512K of RAM, and 640K is desirable. Say good-bye to memory-resident software. Anything other than a full quota of memory in your machine precludes using the program. In fact, Hayes strongly recommends a hard disk. You can shoehorn *Smartcom III* onto a portable with two 720K floppy disks, but it's a tight and uncomfortable fit. The slow floppies on most portables don't help either when loading the large modules.

Smartcom III may not be the best choice if you want one program to run in all environments and on all machines. It's big and bulky, but these days serious PC users have hard disks and lots of RAM. *Smartcom III*'s script language, however, is advanced and versatile. *Smartcom III* will be attractive to those using Hayes modems, and it may be something to consider purchasing if you're certain your non-Hayes modem is completely Hayes compatible.—**Glenn A. Hart**

■ *Smartcom III*'s panoply of features takes a heavy toll on system memory, but its script language is advanced and versatile.

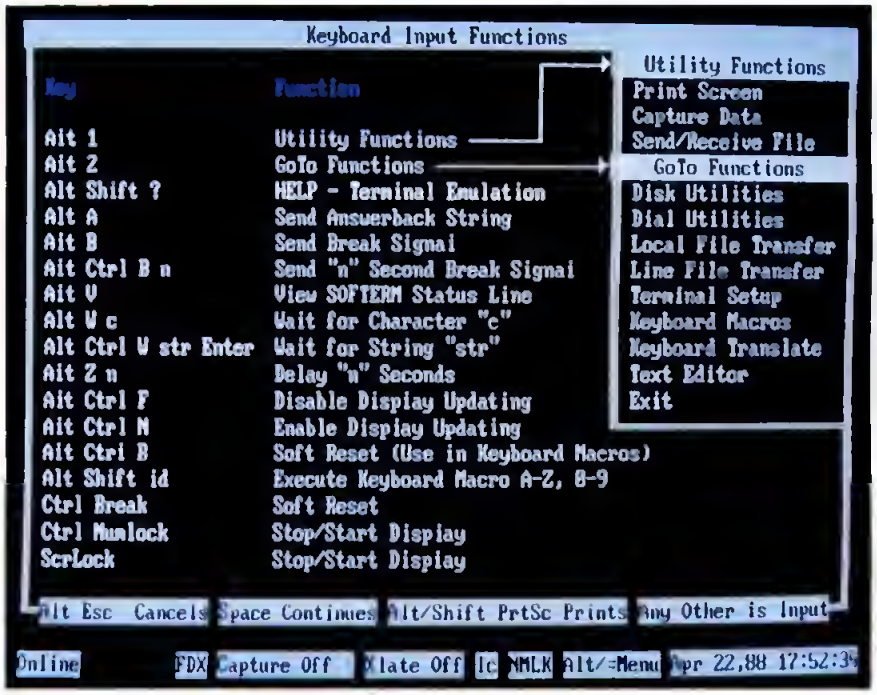
Softerm

Softerm, a $195 industrial-strength communications program from Softronics, has enough features to delight the most jaded PC user. It's not the sort of program you'd fire up on Friday nights to retrieve stock quotes—that would be like flying the Concorde across town. But you would turn to it if your boss asked you to write a bulletin-board system.

If all *Softerm*'s goodies (including terminal emulations, background communications, a full complement of script commands, queue management, and support for multiple operating systems) give you the impression that it also requires considerable time to learn, you're right. It can take weeks to master all the program's features. But installing *Softerm* is easy if you use one of the 23 supported modems.

EXTENSIVE EMULATION *Softerm* emulates almost every terminal on the market, including ADDS, Data General, DEC, Hazeltine, Hewlett-Packard, Honeywell, IBM, Lear Siegler, Perkin-Elmer, TeleVideo, and, of course, the ubiquitous dumb terminal.

After you've used *Softerm* for a few days, its menu-driven interface becomes more of an annoyance than a help. To disconnect from a call, for example, you use the Alt-2 combination to bring up the GOTO menu, then press F2 to pop up the Dial Utility menu, move the cursor to select the Hangup option, press Enter, and then use the Alt-Esc combination to return. Even with practice, this procedure takes time. To help you cope, Softronics blessed *Softerm* with the ability to accept keyboard macros. No keyboard macros come with the program, but the user's manual gives you several examples of how to create them.



Softerm's menu-driven interface helps new users wade through the myriad options offered by the program, but more-proficient users will want to develop macros to save time.

TSR VERSION You can also install *Softerm* in an abbreviated TSR version, called the Communications Agent. This version can send and receive files in the background while you run conventional programs in the foreground. It does not conflict with other popular TSR software such as *SideKick*.

A queue manager allows you to put up to 128 tasks in the communications queue at one time, and to fire them off consecutively or in unattended operation by date and time. The queue manager also controls multiple COM ports, so you can be exchanging files with four sources at the same time.

The Communications Agent enables *Softerm* to offer the File Agent, such a clever and simple option that it deserves an award. Here's how it works. You assign the communications port a device letter, similar to that of a disk drive—*L*, for example. Then, to download a file, all you have to do is issue a DOS COPY command, such as COPY L:WEEKLY.DAT

■ The Communications Agent enables *Softerm* to offer the File Agent, such a clever and simple option that it deserves an award.

PC MAGAZINE FACT FILE

***Softerm*, Version 2.t0.0t**
Softronics Inc.
7899 Lexington Dr., #210
Colorado Springs, CO 80920
(800) 225-8590
(303) 593-9540
List Price: $195
Requires: 256K RAM, DOS 2.1 or later.
In Short: Since it's everything you ever wanted in a communications program and more, this sophisticated package is relatively difficult to use. If you take the time to learn its capabilities—background communications, a complete script facility, emulation for more than 30 terminals, queue management, and support for multiple operating systems—your effort at fluency is paid off in spades. Not copy protected.

CIRCLE 670 ON READER SERVICE CARD

INCREDIBLE SAVING!
OUTSTANDING PERFORMANCE!

FCC 'B' APPROVED

INFO 286 6/12 MHz System

FEATURES:

- 80286 microprocessor with 80287 socket
- Chips & Technology VLSI chipset
- Keyboard selectable 6/10 MHz or 6/12 MHz clock speed
- Expandable to 1MB on board, 640K base memory
- and 384K extension (512/512K optional)
- Legal Award/Phoenix BIOS
- No sockets for Chips & Technology ICs, direct chipset soldering for higher reliability
- Adjusted I/O bus speed for add-on cards compatibility
- 8 input/output slots (6 16-bits, 2 8-bits)
- Up to 15 megabyte system extension memory; 8 megabyte EMS
- Clock/Calendar with battery backup
- 200W power supply (110-220V)
- Space saving case w/keylock protection, reset button, LED's for Turbo, Hard Drive, Power on/off
- Optional digital display of system speed
- 101-key enhanced keyboard w/separate cursor & numeric keypads
- Support 360K, 720K, 1.2MB, 1.44MB disk drives
- Upgrade storage capacity by 20, 30, 40, 80 MB hard drives with WA2, NCL, RLL controllers
- System packing box

Mega 4000 4.77/8 MHz System

FEATURES:

- 8088-2 microprocessor with 8087 socket
- Keyboard selectable 4.77/8 MHz speed
- 4-layer mother board for higher reliability
- Expandable to 640K on board
- Eight expansion slots that allow easy system expansion by using optional plug-in cards
- 150W power supply (110-220V)
- Metal case w/keylock protection
- AT style keyboard, 84 Key Keyboard
- System packing box

INFO 286 12MHz COLOR SYSTEM

COLOR I: $1149

- 512K
- 1.2MB TEAC Drive
- Dual HD/FD Controller
- 200W Power Supply
- Spacing Saving Case
- Clock/Calender with Battery Back up
- 101-Key Enhanced Keyboard (Keytronics)
- Color Graphic w/printer Card
- SamSung RGB Monitor

COLOR II:
W/ ST-225 20MB Hard Drive **$1385**

COLOR III:
W/ ST-251 40MB Hard Drive **$1595**

INFO 286 12MHZ EGA SYSTEM

EGA I: $1349

- 512K
- 1.2MB TEAC Drive
- Dual HD/FD Controller
- 200W Power Supply
- Space Saving Case
- Clock/Calender with Battery Back up
- 101-Key Enhanced Keyboard (Keytronics)
- Enhanced Graphic Adaptor
- Packard Bell EGA Monitor With Stand

EGA II:
W/ ST-225 20MB Hard Drive **$1585**

EGA III:
W/ ST-251 40MB Hard Drive **$1795**

SYSTEM UPGRADE OPTIONS

• ADD 128K	$55
• 1.2MB Teac Drive	$99
• 360K Teac Drive	$85
• 720K Toshiba Drive	$119
• 2 Serial/1 Parallel (2nd Serial Optional +$25)	$35
• Everex 1200 BAUD INTERNAL MODEM	$85
• 2.5MB RAM CARD (OK)	$85
• 101-Key enhanced Keyboard	$59
• Digital Display	$30

INFO 286-12 Starter Package

MONO-I:

- 512K
- One 1.2MB Teac Drive
- Dual FD/HD Controller
- 200W Power Supply
- Space Saving Case
- Clock/Calender With Battery Back up
- 101-Key Enhanced Keyboard (Keytronics)
- Hercules Compatible Mono. Graphic W/Printer Card
- 12" Monitor Packard Bell Hi-Res.

MONO II: W/ ST-225 20MB Hard Drive.... **$1209**

MONO III: W/ ST-251 40MB Hard Drive... **$1419**

Immediate Delivery

OS/2 Compatible

SPECIAL OFFER

Complete **12**MHz **286** System

$975.00

WITH MONITOR

(10 MHz Version Available)

Order Now! 1-800-322-4556

Mon-Fri 7:00 AM -6:00 PM
Sat 9:00 AM -3:00 PM

MEGA 4000 4.77-8MHz TURBO XT SYSTEMS:

INCLUDE:

- 256 K
- One 360K FUJITSU Drive
- AT Style Case
- 150W Power Supply
- Floppy Disk Controller
- AT Style Keyboard

$365

MS DOS 3.3 WITH GW BASIC FOR ONLY $79 WITH PURCHASE OF ANY SYSTEM!

The Company You Can Trust

MAY COMPUTERS

· We are the manufacturer ·

TECH SUPPORT:
(714) 897-2037

RETAIL HOURS
MON.-FRI. 9:00AM - 6:00PM
SAT.& SUN. 10:00AM - 4:00PM
(714) 897-1562

8210 Katella Ave. #D
Stanton, CA 90680
FAX: (714) 897-9173
TLX: 3720117 MAY

ONE YEAR WARRANTY
ON PARTS & LABOR

TERMS: CIRCLE 102 ON READER SERVICE CARD

1. We accept Visa, MasterCard without surcharge COD-Cashier's Check, prepayment, university and corporate POs accepted upon approval
2. Calif. Residents add 6% sales tax
3. Add $3.00 handling charge, plus UPS shipping charge
4. Prices are subject to change without notice

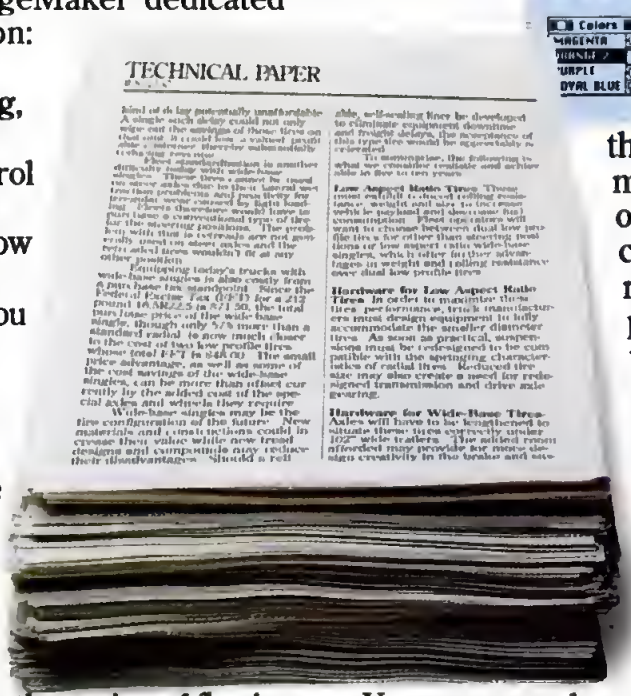
IBM PC/XT, AT are the registered trademark of International Business Machine Corp.

PageMaker

Three years after inventing desktop publishing, the people at Aldus have just re-invented it. With a new version of PageMaker® dedicated to one simple proposition: freedom of choice.

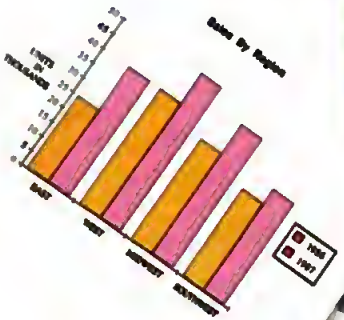
From the beginning, PageMaker has given people unequalled control over all the elements of their publications. But now we've added many new features that also give you the ability to assemble even the longest documents with a couple clicks of your mouse. With PageMaker 3.0 the choice is always yours.

Here are a few of the new ways you'll have to exercise it.



Autoflow

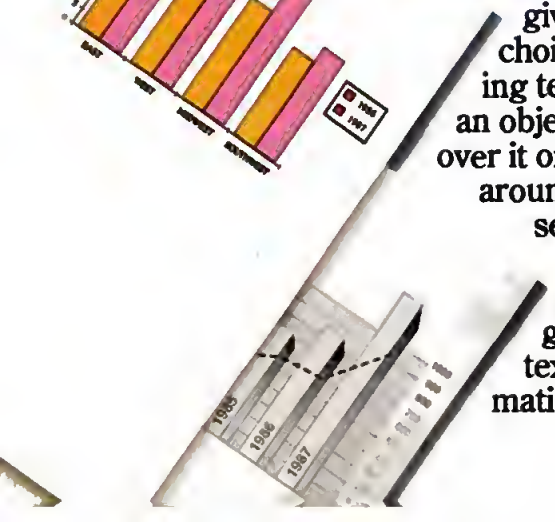
Now you have the option of flowing text automatically to speed up long-document creation or placing it column by column for shorter, more design-intensive pieces.



Text Wrap

Our new text wrap function gives you the choice of flowing text through an object, jumping over it or wrapping around it, like you see here.

And when you move a graphic, your text will automatically reflow around it. You can also control the margin between text and image and, with a custom wrap feature, fit text to even the oddest shape.



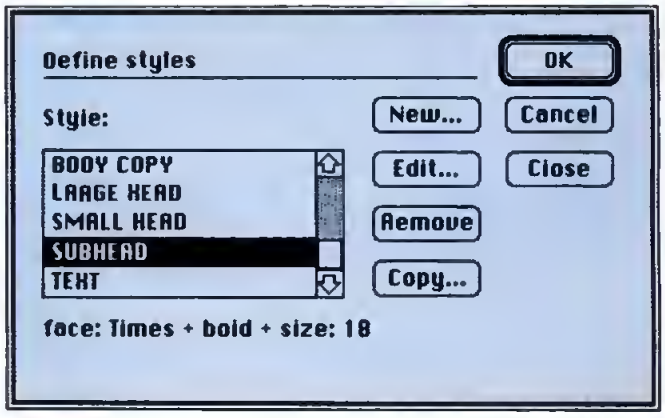
Spot Color

Mix a virtually unlimited palette of colors based on any one of three standard color models: RGB, CMYK or HLS. Then you can tag any element in the publication with a color by just clicking your pointer on it.

And, when you print your document, PageMaker 3.0 gives you the choice of a single composite image or separate sheets for each color used. You can even place registration marks in the corners of your separated output for accurate assembly by a professional printer.

Style Sheets

PageMaker's style sheets give you the ability to create and apply style formats, including color, for all your text. And that allows you to reformat an entire story or document in a single operation.



Is Turning 3.0

You can also tag text in your word processor, database or spreadsheet for instant formatting in PageMaker. And any style commands from Microsoft® Word files are read directly.

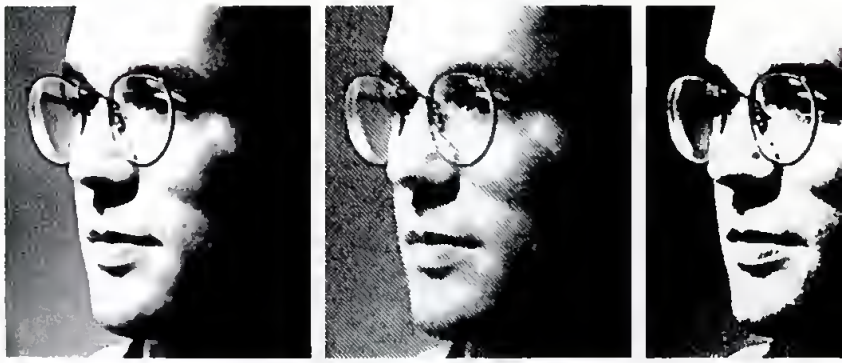
Templates

Since professionally designed templates are now included with PageMaker, it's easy to give every document you create a designer's touch.

You use the templates like blueprints, placing your own headlines, text and graphics according to the designated types and sizes.

Image Control

You can now adjust the lightness or contrast of any scanned image or bit-map graphic you place in PageMaker. And if you want to further customize a graphic, you can use one of our built-in special effects, or even create one of your own.



High Quality Fonts

In addition to supporting a wide range of PostScript® fonts, PageMaker for the PC now expands the capabilities of the HP LaserJet Series II and other PCL output devices.

That's because we're including four Bitstream® fonts and Fontware,™ a special font generator, at no extra cost.

So you'll be able to create bit-map and screen fonts from 6 to 72 points in many versatile type faces. PageMaker 3.0 comes complete with Bold, Roman, Italic and Bold Italic variations of Dutch and Swiss (Bitstream's versions of Times and Helvetica) along with the Courier and Symbol typefaces. Which will give many people the ability to do even more with PageMaker.

EEEEEEEEEEEE

If all this has whetted your appetite to find out more, visit your authorized Aldus dealer today.

And ask for the program that did a number on PageMaker.

ALDUS PageMaker®

411 First Avenue South, Seattle, WA 98104 (206) 622-5500

©1988 Aldus Corporation. The following are registered and unregistered trademarks of the companies listed: PageMaker, Aldus, Aldus Corporation, Microsoft, Microsoft Corporation, PostScript, Adobe Systems, Inc., Hewlett-Packard, LaserJet Series II, Hewlett-Packard Company, Bitstream, Fontware, Bitstream Inc., Times, Helvetica, Linotype AG.

CIRCLE 128 ON READER SERVICE CARD

PC-PLUS™

The High Performance Network Solution Just DOUBLED Its Performance!

The best performing PC-based network for database applications, high performance spreadsheets and all your data and compute intensive needs. PC-PLUS! And now its *twice* as powerful!

Get the details now! Call (617) 875-6100.

PC-PLUS™
The High Performance Network

ALLOY
COMPUTER PRODUCTS

Alloy Computer Products, Inc.
100 Pennsylvania Avenue
Framingham, Massachusetts 01701
(617) 875-6100, TWX: 710-346-0394

Alloy Computer Products, Inc.
9 Executive Circle, Suite 240
Irvine, California 92714
(714) 261-7661

CIRCLE 345 ON READER SERVICE CARD

■ COMMUNICATIONS SOFTWARE

PC MAGAZINE EDITOR'S CHOICE

- **HyperAccess**
- **ProComm/ProComm Plus**
- **Smartcom III**

If you need a high degree of programming control or simply want the biggest and best, any program with a new-generation script language will serve your needs. However, Hayes Microcomputer Products' Smartcom III *stands out for its innovative approach to communications and script language development, and for its straightforward menu system. The program's size (it requires more than 1MB disk space and 512K RAM) makes it unsuitable for anything less than a 286 machine with a fast hard disk. Yet, as reviewer Glenn Hart points out, that (and $249) is merely the price you have to pay for using a program that advances the state of the art.*

Among programs with advanced script languages, Hilgraeve's HyperAccess, *IBM PC Revision 3.25 ($149), is the winner. Not only does its script language border on new-generation capabilites, but the program is easy to learn and use, and it offers the fastest file transfer we measured—both with the proprietary* HyperProtocol *and with the garden variety Xmodem. Any of these features would be worthy of note. Together they make a package that is hard to beat.*

For those whose script language needs are minimal and whose communications needs are casual, Datastorm's ProComm, *for a suggested contribution of $50, or* ProComm Plus, *at $75, is the clear choice. Speed of file transfer is on the slow side for both versions of* ProComm. *But for casual users, the mostly mnemonic commands are easy to learn and remember, the script language is adequate, and added features—like the host mode—are invaluable if you need them.*

C:*.*. The File Agent copies the file from device L: (actually the remote computer) to your hard disk. It does so by intercepting all DOS file calls and executing a script file to import or export the named file. Anywhere you can use a filename, you can use the File Agent.

Both the Communications Agent and the File Agent require you to use a comprehensive script language to control their operations, and *Softerm* provides it. The script language is sufficiently powerful to program a four-port bulletin board running in the background, and for $50 Softronics will sell you the script file it has developed to do just that. The script files included in the package are for routine tasks like logging on to The Source and CompuServe. Learning the language is not easy, but the manual includes examples, and Softronics maintains a telephone hot line that is staffed by knowledgeable people.

Softerm is not without flaws. The layout of the file-transfer screen is poor; introducing color and graphics would help separate the status information from the display of the data being transferred. And since the phonebook dialer is case sensitive, you must remember exactly how you entered a name if you want to find it quickly. Also, the dialer waits 45 seconds before redialing a busy number, and you cannot change that parameter.

Because *Softerm* has so many commands and Alt-key combinations, learning to use it takes a lot of patience and some time. Nevertheless, the program certainly rewards your efforts, with extensive emulations, background communications, a complete script facility, queue management, and support for multiple operating systems.—**Donald B. Trivette** PC

Switch on a serious surge suppressor.

With test after test proving that 70-90% of all PC malfunctions can be traced to power problems, a surge suppressor is the first accessory you should buy for your PC. But don't put your trust in just any surge suppressor. Get one that gives your whole system superior protection. One that's engineered to the highest specifications.

Meets IEEE S87-1980 Category A	✓
Meets IEEE 587-1980 Category B	✓
UL Listed	✓

The right surge suppressor passes all the tests.

Get a Kensington Master Piece® or Master Piece Plus. They're the most popular PC surge suppressors. And the most serious. Because at Kensington, we're dedicated to giving your PC the best possible protection.

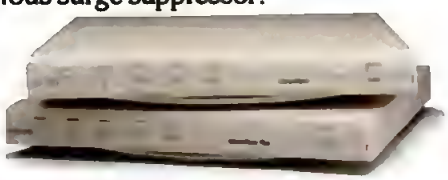
That's why Master Piece and Master Piece Plus are equipped with our unique two-stage surge suppression circuit, containing a high-speed silicon semiconductor for the quick reaction necessary and heavy-duty metal oxide varistors for the brute force required to keep even the largest surges from penetrating into your system.

That's why the plus in Master Piece Plus is additional modem surge suppression circuitry to protect your modem from surges, spikes and noise on the telephone line.

And that's why the circuitry in both models can handle anything an electrical storm or your local power company can offer—up to 6,000 volts with a 3,000 amp follow-on current. (That's the kind of superior performance that passes not only UL* testing, but Categories A and B of the strict IEEE† specification 587-1980 as well.)

Now, this may look to you like we're taking more than the necessary precautions. And actually, we are. But after all, isn't that what you expect from a serious surge suppressor?

Master Piece ($149.95) and Master Piece Plus ($159.95). For more info, or a dealer near you, call (800) 535-4242. In NY (212) 475-5200.



KENSINGTON.

CIRCLE 167 ON READER SERVICE CARD

Corporate America Trusts DMP . . .

- Black & Decker
- Chevron Oil
- Coca Cola
- General Foods
- Honeywell
- ITT
- Maybelline
- Merrill Lynch
- NCR
- Parke-Davis
- Proctor & Gamble
- 3M Corporation
- TRW
- US Government

DMP XT-4/10™

STANDARD FEATURES

- 4.77-10 Mhz Speed Selectivity
- Phoenix Bios®
- 8088-1 Processor, 8087-Ready
- AT-Style Case, w/Key Lock
- Turbo, Power & Disk LED's
- Hardware Reset & Turbo Switches
- 150 Watt Switching Power Supply
- Parallel, Serial & Game Ports
- Dual Floppy Disk Controller
- Clock Calendar w/Battery
- Tactile 101-Key Keyboard
- 360KB Floppy Disk Drive
- Operations Documentation
- One Year Warranty

Monochrome Configurations

With Mono Monitor & Card	$499
With 30MB Hard Disk Drive	$799
With 60MB Hard Disk Drive	$949

CGA Color Configurations

With CGA Color Monitor & Card	$699
With 30MB Hard Disk Drive	$999
With 60MB Hard Disk Drive	$1149

EGA Color Configurations

With EGA Color Monitor & Card	$899
With 30MB Hard Disk Drive	$1199
With 60MB Hard Disk Drive	$1349

DMP 286-6/12™

STANDARD FEATURES

- 6-12 Mhz Speed Selectivity
- Phoenix Bios®
- 80286 Processor, 80287-Ready
- AT "Desk-Saver" Case *w/key lock
- Turbo, Power & Disk LED's
- Hardware Reset & Turbo Switches
- 200 Watt Switching Power Supply
- Floppy/Hard Disk Controller
- Clock Calendar w/Battery
- Tactile 101-Key Keyboard
- 1.2MB Floppy Disk Drive
- 8 Expansion Slots
- Operations Documentation
- One Year Warranty

Monochrome Configurations

With Mono Monitor & Card	$849
With 60MB Hard Disk Drive	$1299
With 80MB Hard Disk Drive	$1549

CGA Color Configurations

With CGA Color Monitor & Card	$1049
With 60MB Hard Disk Drive	$1499
With 80MB Hard Disk Drive	$1749

EGA Color Configurations

With EGA Color Monitor & Card	$1249
With 60MB Hard Disk Drive	$1699
With 80MB Hard Disk Drive	$1949

*Call for current RAM pricing. Deduct $50 for 10 Mhz 286 configurations. Add $25 for full size AT case on 286 systems

Terms: Prices shown are US currency, level 10 wholesale and reflect a 3% cash discount - shipping and insurance extra. Prices and availability subject to change without notice. DMP reserves the right to substitute equivalent or better products. COD and prepays by cashier's check only - personal and company checks take 15 days to clear. 15% restocking fee on un-authorized returns.

. . . You Can Too. TOLL FREE!

DMP386-16/20™

STANDARD FEATURES

- 16-20 Mhz Speed Selectivity
- 80386 Processor, 80387-Ready
- Full Size AT Case
- Turbo, Power & Disk LED's
- Hardware Reset & Turbo Switches
- 200 Watt Switching Power Supply
- Floppy/Hard Disk Controller
- Clock Calendar w/Battery
- Tactile 101-Key Keyboard
- 1.2MB Floppy Disk Drive
- 8 Expansion Slots
- Operations Documentation
- One Year Warranty

Monochrome Configurations

With Mono Monitor & Card.....$1699
With 60MB Hard Disk Drive.....$2099
With 80MB Hard Disk Drive.....$2349

CGA Color Configurations

With CGA Color Monitor & Card.....$1899
With 60MB Hard Disk Drive.....$2299
With 80MB Hard Disk Drive.....$2549

EGA Color Configurations

With EGA Color Monitor & Card.....$2099
With 60MB Hard Disk Drive.....$2499
With 80MB Hard Disk Drive.....$2749

DMP ADVANTAGES

We accept credit card, COD and APO/SPO orders

We accept Purchase Orders with approved credit

In-stock orders shipped within 24 hours

All shipments are insured. We take NO chances!

No sales tax (Michigan friends add 4%)

Free technical support hotline useage for a year

Hundreds of add-on products available to customize your system

Low cost extended warranty programs available

DMP

1-800-PCS-TO-GO

(That's 1-800-727-8646)

(313) 422-1200 Main Lines
(313) 422-1286 Tech Support
(313) 422-1289 Fax Line

Discount Micro Products, Inc.
34360 Glendale
Livonia, MI 48150

Hours: Monday - Friday
9:00 a.m. - 7:00 p.m. EST
Saturday's
9:00 a.m. - 5:00 p.m. EST

CIRCLE 229 ON READER SERVICE CARD

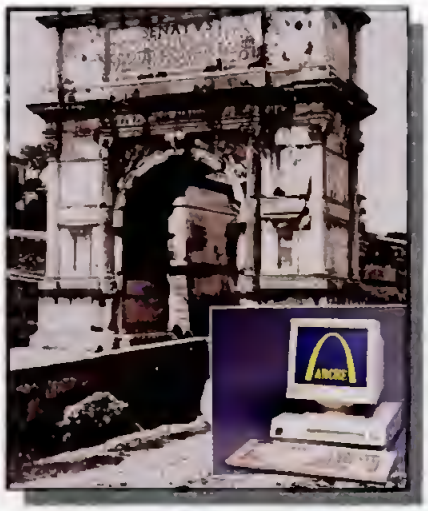
ARCHE
QUALITY ABOVE ALL

Built to Last

Arche Rival 286™ Personal Computer
The St. Louis Arch

Arche Rival 386™ Personal Computer
The Arc de Triomphe de L'Étoile

Arche Pro-File 286™ and 386™ Servers
The Washington Arch



Arche Station 88™ Personal Computer
The Arch of Titus

Arche Super Station 286™ Personal Computer
The Arch of Septimus Severus

2 YEAR ARCHE™ WARRANTY

QUALITY ABOVE ALL™

While others in the computer industry seem preoccupied with offering cheap technology, Arche Technologies offers something different: Quality Technology.

That's why every Arche product is designed by some of the best engineers in the business, and why each unit is hand assembled in the United States, passing through a rigorous series of tests and inspections.

For additional information for these and other Arche quality products or for the quality dealer nearest you please call: toll free 1-800-422-4674 or in MA (617) 461-1111. For Vertical Solution Reseller call: 1-800-272-8898 or in CA (415) 234-6313.

Arche, Arche Logo, Rival 286, Rival 386, Pro-File 286 Server, Pro-File 386 Server, Station 88, Super Station 286, and Quality Above All are trademarks of Arche Technologies, Inc.
©Arche Technologies, Inc., 1988. The Bettmann Archive, Inc.

CIRCLE 111 ON READER SERVICE CARD

THE NICHE FACTOR

NINE ATs COMPETE FOR MARKET SHARE

Demand for AT compatibles is stronger than ever, and manufacturers are jockeying for position in the market. The latest machines reviewed here are from Amdek, American Mitac, Arche Technologies, Core, Dataworld, Epson, Hyundai, Kaypro, and Star Industries.

Now that there is a general consensus that the standard base system for business computing in the next several years is going to be an 80286-based AT compatible running between 8 and 12 MHz, complete with 1 or 2MB of RAM (more when OS/2 applications are available) and a hard disk of at least 20MB, manufacturers of AT compatibles are competing for individual niches, following the age-old business adage that a small slice of a big market is just as good as total control of a small market.

For the computer buyer, price is no longer a barrier to AT-level performance. When *PC Magazine* evaluated 21 286-based systems configured with monochrome monitors and hard disks with total price tags under $2,000 ("The Cheapest ATs Ever," *PC Magazine*, February 16, 1988), we found that although quality and features varied significantly from machine to machine, over half of the systems were perfectly legitimate choices. And even the scrawniest one of the bunch could outperform an XT by a factor of two.

Prices of AT-compatible systems still cover a wide spectrum, however. Famous-name manufacturers like NEC, Epson, Leading Edge, and NCR can (and do) ask more for a 286 system than a big mail-order house like CompuAdd does. What you pay for is a comfortable measure of confidence: the known quality of a known quantity. But now that dozens of systems can be

AT Compatibles: Summary of Features

(Products listed in ascending price order)

BASIC CONFIGURATION	Star Industries AT 286	Core ATomizer	Hyundai Super-286C	Epson Equity II Plus	Dataworld Data 286	Arche Rival 286
Price	$895	$1,350	$1,499	$1,595	$1,605	$1,795
RAM	512K	512K	640K	640K	512K	640K
Floppy disk drives	One 1.2MB	One 1.2MB	One 1.2MB	One 1.2MB	One 1.2MB	One 1.2MB
Hard disk	None	None	None	None	None	None
Clock/calendar	●	●	●	●	●	●
Software	*PC-Write*	DOS 3.2 or Xenix; backup utilities	DOS 3.2; setup	DOS 3.2; diagnostics, GW-BASIC, *SpeedStor*	Setup	DOS 3.3
Monitor	None	None	None	None	12-inch EGA	14-inch monochrome
Ports	1 parallel	1 parallel, 1 serial	1 parallel, 2 serial	1 parallel, 1 serial	1 parallel	1 parallel, 2 serial
Slots	6 16-bit, 2 8-bit	6 16-bit, 2 8-bit	4 18-bit, 2 8-bit	3 16-bit, 3 8-bit	6 16-bit, 2 8-bit	6 16-bit, 2 8-bit
Power supply (watts)	200	200	135	140	200	200
Reset switch	●	●	○	●	●	●
Keyboard style	IBM Enhanced	IBM Enhanced	IBM Enhanced	IBM Enhanced	IBM Enhanced	IBM Enhanced
CONFIGURATION TESTED						
Price	$1,273	$2,826	$2,249	$3,643	$2,439	$2,195
Configuration	30MB hard disk, monochrome monitor	40MB hard disk, EGA monitor	30MB hard disk, monochrome monitor	40MB hard disk, EGA monitor	1MB RAM, 40MB hard disk, EGA monitor	20MB hard disk, monochrome monitor
SPECIFICATIONS						
Clock speed (MHz)	8/10	6/8/12	8/10	8/10	8/12	8/12
Controller card handles	2 floppy, 2 hard disk drives	2 floppy, 2 hard disk drives	2 floppy, 1 hard disk drive	2 floppy, 2 hard disk drives	2 floppy, 2 hard disk drives	2 floppy, 2 hard disk drives
OTHER						
Alternative disk drives	None	None	None	720K 3½-inch*; 360K 5¼-inch*	720K 3½-inch*	None
Warranty	1 year	1 year	18 months	1 year	1 year	2 years
BIOS manufacturer	Award Software	Phoenix	Award Software	Epson	Phoenix	Award Software
FCC certification class	B	B	B	B	B	B

—Indicates Editor's Choice ●—Yes ○—No *Optional †Standard

found south of the $2,500 border, the big-name companies have had to take a hard look at their pricing structures. These days, a little shopping may lead you to a name-brand system discounted up to 30 percent. How else can such companies compete with machines like the 21 we recently reviewed, whose average configured price was about $1,600?

WINNING WITH ORIGINALITY As price distinctions blur, buyers look to features to find differences between systems, and this is where the niche factor comes into play. One trend is the reemergence of backplane designs, which hark back to the good old days of CP/M machines when wide-open architecture was the name of the game. The TeleVideo Open Architecture Solution series, the new Kaypro 286, and the Amdek System 286A represent three examples of the backplane design. (The Kaypro and Amdek machines are reviewed here.)

Why do it? By putting the vital chips on expansion cards rather than on the motherboard, the box is theoretically immunized against obsolescence. When your desire

	Amdek System 286A	Kaypro 286	Milac Paragon 286F
	$2,495	$2,995	$3,495
	1MB	1MB	1MB
	One 1.2MB	One 1.2MB	One 1.2MB
	None	40MB	40MB
	●	●	●
	DOS 3.2; GW-BASIC, disk caching, other utilities	DOS 3.2; GW-BASIC, *SpeedStor*, *WordFinder*, *WordStar* 4.0	DOS 3.2; *Disk Manager*
	None	12-inch monochrome	12-inch EGA
	1 parallel, 1 serial	1 parallel, 1 senal	1 parallel, 2 senal
	5 16-bit, 2 8-bit	2 16-bit, 3 8-bit, 4 for system	4 16-bit, 1 8-bit
	190	160	145
	○	●	●
	IBM Enhanced	IBM Enhanced	IBM Enhanced
	$4,740	$2,995	$3,495
	40MB hard disk, EGA monitor	40MB hard disk, monochrome monitor	40MB hard disk, EGA monitor
	8/12.5	6/12	6/12
	2 floppy, 2 hard disk drives	2 floppy, 2 hard disk drives	2 floppy, 1 hard disk drive
	None	None	720K 3½-inch[1]
	1 year	1 year	1 year
	Phoenix	Phoenix	Phoenix
	B	B	A

for a 386 processor becomes unbearable, you'll just buy one on a card and swap it into a slot.

Do you care about the size of your system? Some people would pay any price to get that big AT box (21 inches wide) off their desk. Many recently introduced AT compatibles let you do that; machines reviewed here from Amdek, American Mitac, Arche, Epson, Hyundai, and Star Industries are good examples. One note of caution: designers of smaller system units have two methods of achieving their slimdown goals—by cutting out drive bays or cutting out expansion slots. You should make sure that the small-footprint machine that has caught your eye will accommodate all the devices you need. One way small-footprint manufacturers can compensate for a dearth of slots is to install a well-designed motherboard that can provide many of the functions normally assigned to slot-hungry multifunction cards (memory expansion, parallel and serial ports).

SPEED MACHINES The year 1988 has seen the introduction of souped-up versions of older AT favorites. The Epson Equity III Plus, for example, has been revamped and now runs at a top speed of 12 MHz, up from 8 in the original model. Speed is always an advantage—at least until you run into a small attack of software incompatibility. This is less of a problem than it was a year ago ("High-Speed ATs: Life in the Fast Lane," *PC Magazine*, April 14, 1987), but it's important to choose a machine that can be throttled down, either by an external switch or a setup program, when the need arises.

Reviews of nine new AT-compatible systems follow. They are the most recent arrivals to PC Labs, and they represent a good cross section of the market as it exists today. The cheapest—the Star Industries AT 286—is $1,273 configured with hard disk and monitor; the most expensive—the Amdek System 286A—is over $4,500 fully configured. There are names you know (Epson, Kaypro, Core) and names you may never have heard before (Mitac International is a Taiwan-based manufacturer, and Arche Technologies is a division of Pro-Kennex, the tennis racket people). Rounding out the group are a new machine from Korean giant Hyundai and a mail-order bargain from Dataworld. In the near future we will review two more new competitors who are joining the fray—the Leading Edge Model D2 and the PC's Limited System 200.

Shopping for an AT compatible is more complicated than ever, but having a wide range of machines to choose from means you're that much more likely to find the system that's perfect for your needs and your budget. Reviews follow in alphabetical order by manufacturer's name.

—Donald P. Willmott

AMDEK CORP.

Amdek System 286A

The Amdek System 286A is a classy, fast, and upgradable small-footprint AT-compatible machine. From its 16-character LCD system unit display to its modular internal design, the 286A is pleasing to look at and a joy to use.

The 286A costs $2,495 and comes with 1MB of 80-nanosecond RAM, a Phoenix ROM BIOS for IBM compatibility, and a dual-speed 8- or 12.5-MHz clock. It flies along at zero wait states and achieved the fastest performance in benchmark testing of processor and memory speeds.

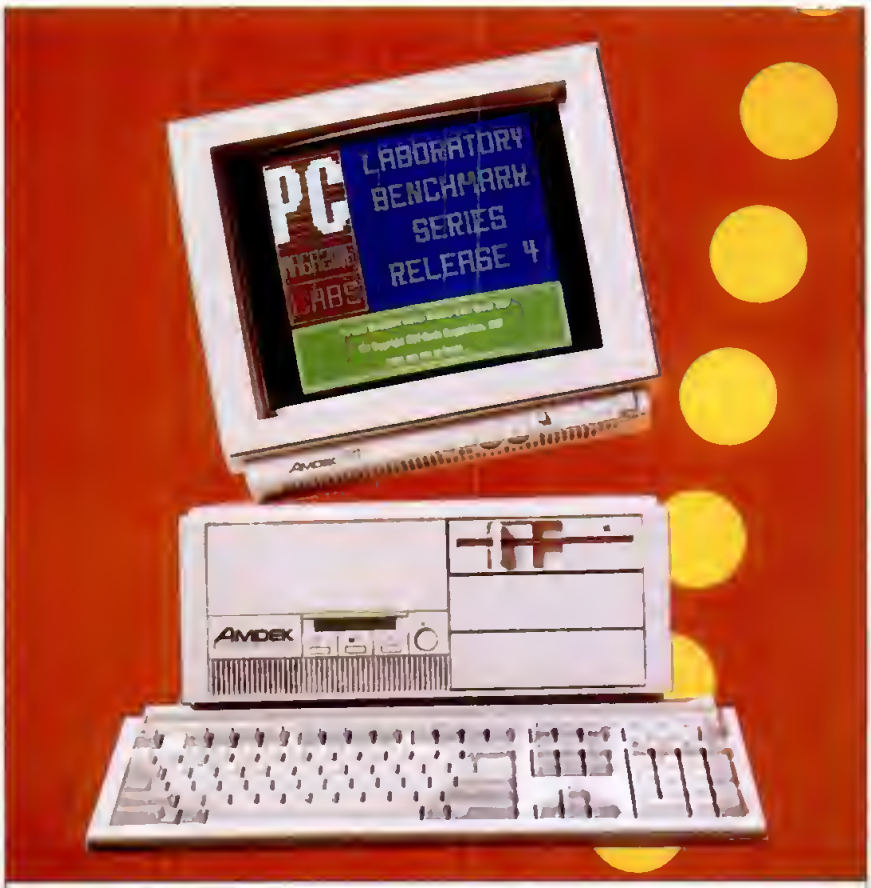
The 286A system box design is high-tech looking. It's 6½ inches high, only 15 inches wide, and a full 17 inches deep. You turn the machine on with a front-mounted power button and select system performance clock speed with a second front-panel button. The LCD tells you the time, date, and current operating speed. You can also toggle a performance indicator that uses a horizontal bar graph to display relative processor efficiency depending on the task at hand. The liquid crystal

EDITOR'S CHOICE

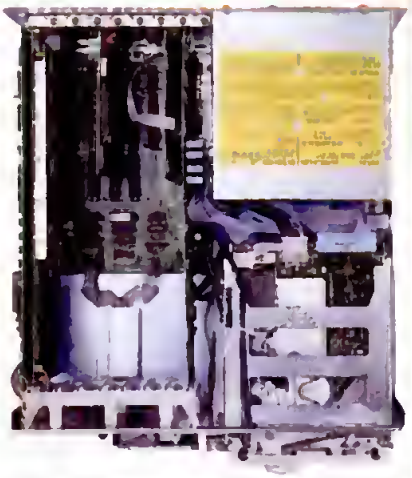
PC MAGAZINE FACT FILE

Amdek System 286A
Amdek Corp.
1901 Zanker Rd.
San Jose, CA 95112
(408) 436-8570
List Price: With 1MB RAM, one 1.2MB 5¼-inch floppy disk drive, DOS 3.2, $2,495; with 40MB hard disk, $3,595; monochrome monitor and card, $360; EGA monitor and card, $1,145.
In Short: Largely OEMed from its sibling, Wyse, the small-footprint System 286A is a high-quality, 12.5-MHz 80286 system with nice finish work and a fine 101-key keyboard. Modular motherboard allows for future upgrading without your having to buy a new machine. In this case, you do get what you pay for.

CIRCLE 683 ON READER SERVICE CARD



The most interesting feature of the neatly designed Amdek System 286A is its motherboard, or lack thereof. Because the processor and other essentials reside on an expansion card, future upgrades are not only possible but easy as well. The system is an Editor's Choice.



Photographs: Roberto Braun

display isn't important to system performance itself, but it's a nice touch.

SETUP SOFTWARE The Amdek setup software uses a single screen display. All you need to do in order to configure your machine is to use the Enter key and the keyboard function keys. Preparing the 286A for use is made simple by a high-quality, 64-page installation and assembly manual. The system also includes disks and manuals for DOS 3.21 and GW-BASIC and three utility software packages: Diskcache, Help, and Diskpack.

You can install up to three half-height devices in the 286A. The evaluation unit came with a 1.2MB 5¼-inch floppy disk drive and a 28-millisecond CDC 40MB hard disk. The 190-watt power supply has three power leads for disk or tape drives.

The 286A's internal electronics are different from the norm. Many of the chips and much of the operational circuitry normally found on the motherboard are located on two vertically mounted boards that plug into the motherboard. The plug-in devices include both the system's CPU and RAM chips.

This setup, actually manufactured by Wyse Technology, uses the motherboard more as a bus in which to plug compatible devices than as the repository for the actual brains and chief operating devices of the computer. The major advantage to this modular design is the potential it affords for easy improvement: you can upgrade the system with a faster processor or different memory just by pulling out a board. Amdek currently has an 80386 board in the works that will plug into this system board. Pricing has not yet been set.

Standard equipment includes a combination floppy/hard disk controller, as well as one parallel and two serial ports. The 101 key keyboard supplied with the 286A is another piece of good news. It is manufactured by Wyse for Amdek and has tactile response, with good travel and a nice click. It's almost as good as the "real" IBM Enhanced keyboard.

Amdek uses the standard IBM work-alike Phoenix ROM BIOS: in this case, Version 1.83. It easily passed the benchmark tests that are dependent on BIOS compatibility.

UPSCALE MACHINE The Amdek is definitely an upscale machine and is sold through a dealer network that also furnishes service and support. While the 286A is not as expensive as IBM or Compaq machines, it's on the high end of the price scale of most of the AT-class computers we've tested. With a reasonably fast 40MB hard disk and an EGA video board and monitor, the 286A lists for $4,740—that's $1,250 to $1,900 more than the prices of other similarly equipped

Presenting the Ricoh PC LASER 6000 personal printer.

At six pages per minute, it's the perfect tool for people who like to work, not to wait. A printer that'll give your input the kind of output you'd expect from a machine four times its size.

Its sleek, compact body measures in at a mere 16 inches wide and 16.5 inches deep. Which practically gives you the freedom to place it just about anywhere in your office. (However, we simply suggest you put it next to your PC.)

It also comes with its own printer control language that's supported by a variety of popular software programs. Add one of our optional emulation cards, and your choice of compatible software is virtually unlimited.

The Ricoh PC LASER 6000 also has one megabyte of memory (expandable to two) so you can print the most sophisticated desktop publishing graphics.

And best of all, it's very affordable.

So, the next time you're waiting around for your current office printer to print, look into buying a Ricoh PC LASER 6000 for yourself.

It's a great way to get out on your own.

For more information on the Ricoh PC LASER 6000, call 1-800-HI-RICOH.

RICOH
LASER PRINTERS

CIRCLE 749 ON READER SERVICE CARD

To each, his own.

© 1990 Ricoh Corporation. IBM is a registered trademark of International Business Machines Corporation. PageMaker is a registered trademark of Aldus Corporation. Microsoft is a registered trademark of Microsoft Corporation. Flight Simulator is a registered trademark of SubLOGIC Corporation.

Choose the Wrong

"I just assumed..."

These are the three most deadly words in business.

When others hear them, they know what happened.

Someone didn't do his homework.

Someone didn't ask the right questions.

Someone didn't think.

The next operating system you choose will have far-reaching consequences...in terms of cost, compatibility, and connectivity. Make sure your recommendations aren't based on false assumptions.

"Tell me again why our next operating system will cost over $1,000 per computer."

When they tell you that OS/2 will be a low-cost upgrade, don't believe it.

Computerworld's March 7, 1988, front-page story stated that OS/2 could cost "nearly $5,000 in additional expenses" for each IBM PC AT...to cover the costs of memory expansion and a new display.

"Even if you just bought an IBM Personal System/2 Model 50 last week," the report continued, "you are probably looking at extensive upgrade costs..." $1,750 for more memory, alone.

Plus, you'll need to add the costs of new applications software, the costs

Operating System...And You'll Pay.

of training, and the costs of the system.

All in all, a very expensive upgrade.

"How can you say this operating system is compatible...when half our computers can't even run it."

Take a look around at the mix of PCs your company uses.

Think one version of OS/2 can be used as a company standard?

Think again.

Because each brand of 80286 or 80386 PCs or PS/2s needs its own machine-specific version. And each version has its own set of hardware and software compatibilities.

8088-PCs are totally out of the picture, and PC-DOS programs don't run while you're interacting with an OS/2 application.

"So you're telling me that to play it safe, we should use the operating system's network... or use none at all."

Open architecture is what built the business PC industry...because it enables you to mix and match the best software with the best hardware for your specific needs.

Which makes you wonder just how smart it is to install an operating system designed for a specific network... that may or may not be best for you. That may or may not be compatible with the networks you already have.

Our competition wants you to buy it all from them.

We give you a choice.

So we're compatible with the networking standard: Novell.

We take advantage of the fastest software-driven network: LANLink 5X.™

And we work with the standard in micro-to-mainframe connectivity: Irma by DCA.

"What's this I've heard about operating systems designed for multi-user work groups?"

In short, they're the way of the future.

Because they address the very same needs that most concern you.

Like cost, compatibility, and connectivity.

PC-MOS is a unique DOS-compatible, multi-user operating system. It lets departments use inexpensive dumb terminals (or 8088-PCs running terminal emulation software) in combination with host computers.

Because it's multi-user, you can share a PC's data, programs, memory, and processing power with workstations costing under $500, each.

"If PC-MOS can save us over $1,000 per user, why aren't we using it?"

Good question.

Because with PC-MOS, you get an operating system that lets you share your computers' resources instead of forcing you to spend up to $5,000 per user upgrade.

PC-MOS was designed to be an operating system standard for the mix of 80286 and 80386 PCs in your company. So you don't have to worry about varying levels of compatibility among your PCs.

It's an operating system that provides compatibility with the hardware and software you have. And it provides a migration path to future applications which will take advantage of the 80386 processor's 32-bit mode.

PC-MOS is available for both 80286 and 80386 PCs and PS/2s.

It comes in single-user, five-user, and 25-user versions, starting at $195, all of which include a money-back guarantee.

For complete details, call The Software Link at 1-800/451-LINK.

THE SOFTWARE LINK

PC-MOS/286™, PC-MOS/386™, and LANLink 5X™ are trademarks of The Software Link, Inc. PC AT, PS/2, Personal System/2, PC-DOS, & OS/2 are trademarks of IBM Corp. IRMA is a trademark of DCA, Inc. Prices and technical specifications subject to change. Copyright ©1988. All Rights Reserved.

CIRCLE 393 ON READER SERVICE CARD

machines in this round of AT-type computer testing. But the 286A's class shows in both its design and performance, and the modular design could save you money later on system upgrades.—**Bruce Brown**

AMERICAN MITAC CORP.

Mitac Paragon 286F

The small-footprint Mitac Paragon 286F, from American Mitac Corp., has the most expensive base price of the AT compatibles reviewed here, but it also has the largest number of standard features. For $3,495 you get 1MB RAM, two floppy disk drives, a 40MB hard disk, and an EGA monitor. Clearly, Mitac wants to be considered a one-stop shopping solution.

The most unique feature of the Paragon 286F is the vertical 3½-inch drive bay on the right-hand side of the machine. The 720K 3½-inch microfloppy disk drive that sits inside it is a standard feature (along with the customary 5¼-inch drive) and makes media transfer as easy as typing COPY A:*.* B:. Like IBM, Mitac is making a move toward the 3½-inch media standard. But, unlike IBM, it is doing it with low-density drives. A 1.44MB drive would have been a better choice.

SHRINK-WRAPPED Despite the small footprint (it's only 14¾ inches wide), the Paragon 286F does not skimp on features, though its mass storage capability is limit-

The Mitac Paragon 286F has a vertically mounted microfloppy disk drive to the right of its drive bays, giving it a unique appearance. The small-footprint package includes just five expansion slots, but all the vital ports, including video, are built into the motherboard.

PC MAGAZINE FACT FILE

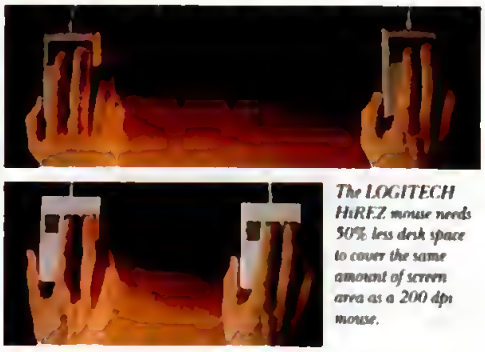
Mitac Paragon 286F
American Mitac Corp.
410 E. Plumeria
San Jose, CA 95134
(408) 432-1160
List Price: With 1MB RAM, one 1.2MB 5¼-inch floppy disk drive, one 720K 3½-inch floppy disk drive, 40MB hard disk, 12-inch EGA monitor and card, VGA controller on board, DOS 3.2, $3,495. Monochrome monitor and card, $119.
In Short: A high-quality 12-MHz 286 machine that comes with a hard disk and monitor included in the base price. The EGA monitor isn't great, but the rest of the system is top-notch, and the standard 3½-inch microfloppy disk drive is an extra advantage.

CIRCLE 676 ON READER SERVICE CARD

Introducing the most agile mouse ever to set foot on a desktop.

The LOGITECH HiREZ Mouse—the only mouse expressly designed for high-resolution screens.

With a resolution of 320 dots-per-inch (as compared with 200 dpi or less for ordinary mice), it covers the same area on your high-res screen, but needs less of your desk to do it. More than 50% less. Saving you valuable desk space, and effort: mouse maneuvers that used to require a sweep of the hand are now reduced to a flick of the wrist.



The LOGITECH HiREZ mouse needs 50% less desk space to cover the same amount of screen area as a 200 dpi mouse.

Which makes this new mouse a hand's best friend. And a more reliable, long-lasting companion—fully compatible with all popular software, and equipped with a Lifetime Guarantee.

Equipped, too, with other advantages exclusive to all Logitech mice: A unique lightweight ergonomic design. Low-angled buttons for maximum comfort and minimum fatigue. An exclusive technology that guarantees a much greater life span. An exceptionally smooth-moving, dirt-resistant roller ball. And natural compatibility with all PCs, look-a-likes, and virtually any software.

So if you've got your eyes on a high-res screen, get your hands on the one mouse that's agile enough to keep up with it.

The LOGITECH HiREZ Mouse.

For the dealer nearest you, call **800-231-7717 (800-552-8885** in California), or write Logitech, Inc., 6505 Kaiser Drive, Fremont, CA 94555. In Europe, call or write: Logitech Switzerland, European Headquarters, CH-1111 Romanel/Morges, Switzerland (++41-21-869-9656).

LOGITECH

CIRCLE 182 ON READER SERVICE CARD

ed. There is room up front for two exposed half-height devices, as well as the vertically positioned microfloppy drive. All the bays were filled on the evaluation unit with standard equipment: a 1.2MB 5¼-inch floppy disk drive, a 40MB half-height hard disk, and the 720K microfloppy disk drive. Though the motherboard offers only five expansion slots (four 16-bit and one 8-bit) it compensates by offering two built-in serial ports, a parallel port, the floppy disk controller, and the enhanced EGA video port. The only slot that needs to be occupied to run the machine is the one holding the hard disk controller.

The front panel of the machine includes the drive bays, a lock, the on/off switch, a reset switch, and lights to indicate hard disk activity and 12-MHz turbo mode.

In microprocessor testing, the Paragon 286F performed on a par with other 12-MHz machines. Its 8-MHz operation was also without surprises. The 40MB Microscience hard disk that was installed in the Paragon 286F was an able performer and rated an average access time of 32 milliseconds in the hard disk benchmark tests. The Phoenix ROM BIOS ensures excellent compatibility.

The 12-inch EGA monitor included with the system produces good text, but the colors are hazy, lacking the vibrancy that EGA users demand. A switch below the screen allows the user to select green, amber, or white characters in text mode. Here is where the one-stop shopping solution stumbles. Getting ten pieces put into one system for one price is certainly an easy way to shop, but what if one of the pieces (a $500 piece in this case) is unacceptable?

KEYBOARD CONSIDERATIONS Since it plugs into the front of the computer and has an extra-long cord, the keyboard, which seems oversized when placed in front of the diminutive chassis, can be used far from the screen. It is of the standard 101-key IBM Enhanced-style design and has a soft touch with little audible feedback.

Standard software includes DOS 3.2 and its manuals and Ontrack's *Disk Manager*. A clear and well-illustrated user manual also comes with the system. Given the fact that a 40MB hard disk is standard, Mitac might want to consider including DOS 3.3 with the Paragon 286F so that disk partitioning is not necessary unless the user wants to do it. All Mitac machines come with a 1-year warranty.

The Mitac Paragon 286F is by no means a bargain machine, though its everything-for-one-price packaging makes the $3,495 price tag understandable. Mitac has positioned the system as a corporate solution, and it is but one member of a family of PCs that range from an XT-class machine all the way up to a 20-MHz 386-based PC. In the 80286 category, Mitac also offers the Paragon 286VE, a 16-MHz 286 machine priced $500 above the level of the Paragon 286F. Evaluation units were unavailable at the time of this review.

If you're operating with the kind of budget the Paragon 286F demands, the machine is worth a look. Mitac's attempt to distinguish itself by traveling the high-quality road in the AT-compatible market is, for the most part, successful.

—Donald P. Willmott

OUR REVIEWERS

Greg Alwang is a consultant at Soft Industries, an independent computer consulting firm based in Southington, Connecticut.

Bruce Brown is a principal of Soft Industries, an independent computer consulting firm based in Southington, Connecticut.

Jonathan Matzkin is a staff editor of *PC Magazine*.

Catherine D. Miller is an associate editor of *PC Magazine*.

Donald P. Willmott is an associate editor of *PC Magazine*.

ARCHE TECHNOLOGIES

Arche Rival 286

Although Arche Technologies is a new player in the computer field, its parent company, Pro-Kennex, is an established manufacturer of racquetball and tennis rackets. The $1,795 Arche Rival 286 is made in the United States and is built upon the same principle of quality that has given Pro-Kennex its competitive market edge.

EDITOR'S CHOICE

PC MAGAZINE

FACT FILE

Arche Rival 286
Arche Technologies
745 High St
Westwood, MA 02090
(800) 422-4674
(617) 461-1111 (in Mass.)
List Price: With 640K RAM, one 1.2MB 5¼-inch floppy disk drive, 14-inch monochrome monitor and card, DOS 3.3, $1,795; with 1MB RAM, $1,995; with 20MB hard disk, $2,195, EGA monitor and card, $600.
In Short: An aesthetically designed and solidly built 12-MHz 286 machine, the small-footprint Arche Rival 286 performs in the same range as do other machines in its class (with the exception of its slow, optional 70-millisecond hard disk). Its beautiful 14-inch flat-screen monochrome monitor really sets it apart.

CIRCLE 682 ON READER SERVICE CARD

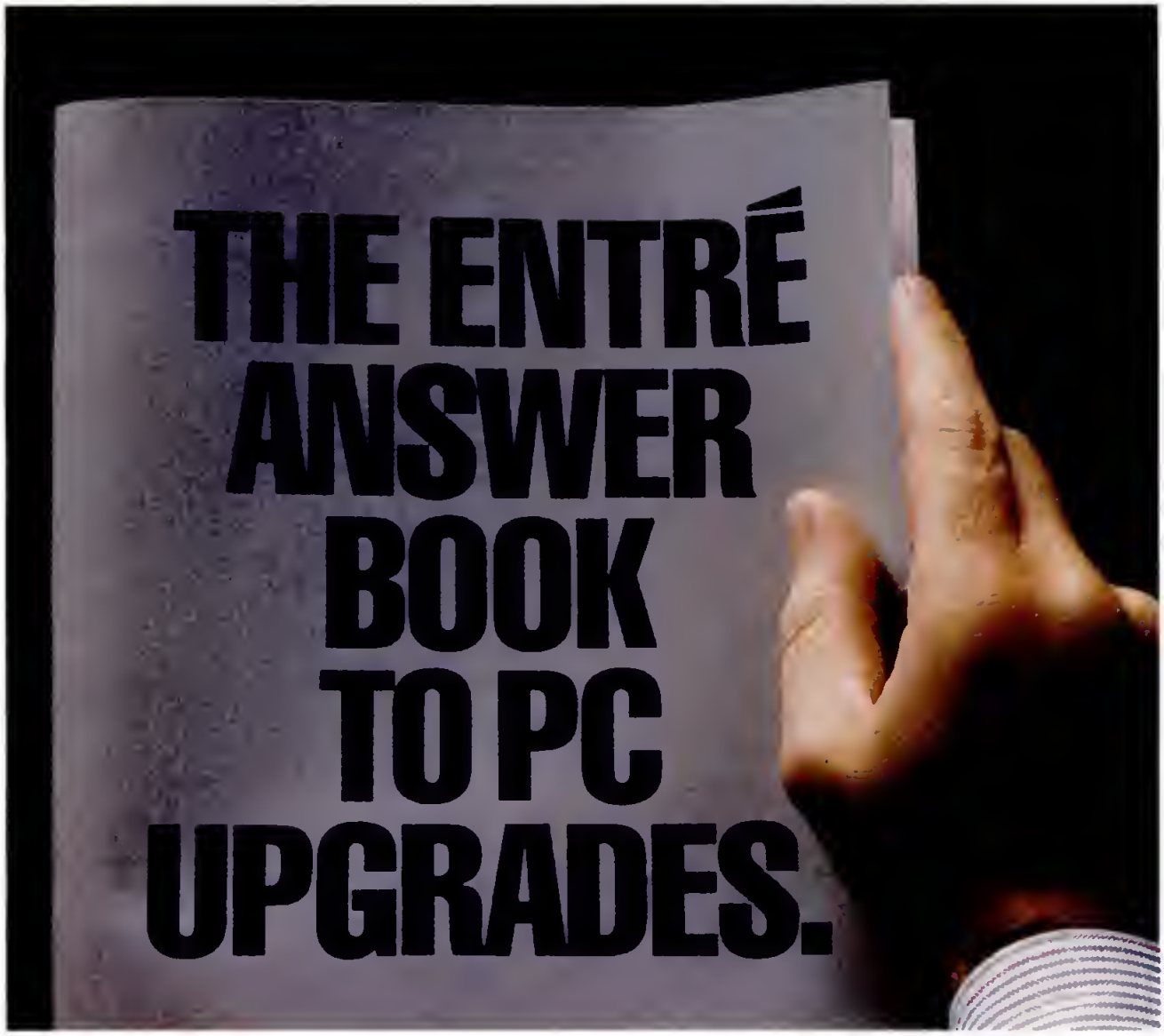
Arche Technologies is so confident of the Arche Rival 286's construction quality that it offers a 2-year warranty.

The first thing you notice when you look at the Arche Rival 286 system is its small footprint—6 inches high by 17 inches wide by 17¼ inches deep—and aesthetically pleasing design. Its solid construction and attention to detail—everything is nicely finished inside and out—inspire confidence.

SWITCHABLE SYSTEM The Arche Rival 286 is an 8/12-MHz switchable system. The turbo switch and the reset switch are conveniently located on the front panel of the system; however, the power switch is located in the customary place on the right side of the case. An indicator light lets you know when you're operating at the 12-MHz turbo speed.

But the most striking system component is the 14-inch amber monochrome monitor, which is manufactured by Arche Technologies. This flat-screen phosphor display has 1,000-line resolution in the center of the screen and 800-line resolution at the corners. It has the usual brightness and contrast controls on the left side of the monitor and has vertical and horizontal hold adjustments at the rear of the monitor.

The monochrome video adapter board that comes with the system doesn't have



WHAT YOUR OLD COMPUTER SYSTEM NEEDS IS SOME NEW INFORMATION.

Since you last bought a microcomputer system, you may have noticed that they are getting more powerful, more productive and less complicated all the time. You may also have wondered how you're going to keep up.

Do you try to get more out of the system you have? Do you opt for enhancements to improve speed and memory? Or would it be more cost effective just to buy a new system?

At Entré, we understand your concerns. In fact, we've written a book about it. It explains in clear, concise English how you can make your system more productive and more efficient. And how the experts at your local Entré Computer Center can help you with products, training, service and support.

What's more, it's free. Just send the coupon to Entré or call 1-800-635-7500. It could be the most important data you've ever called up.

Entré Answer Book
P.O. Box 5075
Rosemead, CA 91770-0960
1-800-635-7500

Name_____

Address_____

_____

City_____

State_____ Zip_____

PCM

ENTRÉ COMPUTER CENTERS™

THE BRAINS BEHIND BUSINESS COMPUTERS.™

Entré Computer Centers are independently owned and operated. © 1988 Entré Computer Centers, Inc. ™Trademarks of Entré Computer Centers, Inc.

CIRCLE 257 ON READER SERVICE CARD

Insist on a Sysgen 5¼" drive for your PS/2.

Here's why:

A Sysgen™ Bridge-File™ gives a PS/2™ full access to your current data and software, with unparalleled 5¼" disk drive performance and reliability. You get: A larger capacity drive. Two modes — a 360Kb and a powerful 1.2 Mb — assure you comprehensive transfer capabilities and convenience for total office needs. Others, like IBM®'s, offer only 360Kb. Proven reliability. In fact, Sysgen is the choice of over 100,000 satisfied Bridge-File and tape back-up users. No slot loss. The Sysgen 5¼" drive adapter card doesn't take any additional slot space. IBM's does. Built-in flexibility of an external connector. You can add another Bridge-File drive or Sysgen's high-performance tape back-up system, Bridge-Tape.™ (As a Bridge-File owner, you receive a total savings of $135 on Bridge-Tape!) What's more, Sysgen's footprint is smaller. A full 50% smaller than IBM's. For the best PS/2 access to 5¼" disks, and the best value at only $325, insist on Sysgen Bridge-File.

Sysgen offers the only complete family of data transfer products: Including the 3½" Bridge-File floppy disk drive, for transferring information from any PS/2 to any PC. And the Bridge-Tape subsystem that's PC and PS/2 compatible, giving you total tape back-up and data transfer flexibility.

Call for Sysgen literature or for the location of the Sysgen dealer nearest you.

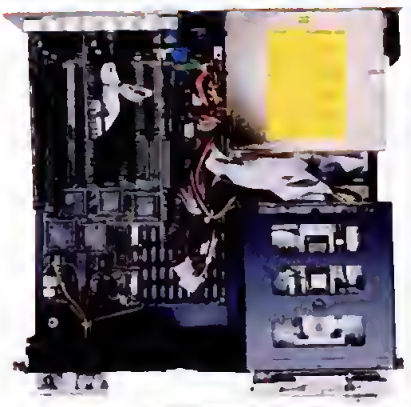
INFO HOTLINE 1-800-821-2151

SYSGEN
INCORPORATED

Sysgen Incorporated, 556 Gibraltar Drive, Milpitas, CA 95035, (408) 263-4411. © Copyright Sysgen, Inc., 1988.
Trademarks: PS/2 — IBM Corporation, Sysgen, Bridge-Tape, Bridge-File — Sysgen, Inc. Registered trademarks. IBM — IBM Corporation.

CIRCLE 173 ON READER SERVICE CARD

An Editor's Choice, the Arche Rival 286 is most admirable for its excellent 14-inch, flat-screen high-resolution amber monitor, which is standard in the $1,795 system. Hard disks are available, but you'd do best to add your own. The tested disk turned in a 70-millisecond access time



graphics capabilities, so I replaced the original board with a Hercules graphics board. The display was even better yet; this monitor is a standout.

The system is designed around the Chips and Technologies' VLSI AT chip set. The unit I evaluated came with 1MB RAM on the motherboard, although 640K RAM is standard for the basic system. Four banks of 256K-bit 100-nanosecond parity-checked RAM chips are arranged in a standard configuration, running with one wait state. There is an open socket available for the Intel 80287 coprocessor chip.

The Arche Rival 286 has the usual eight expansion slots (two 8-bit and six 16-bit) and has three half-height drive bays. The clock/calendar uses a rechargeable 3/600K nickel cadmium battery from Varta. This battery will recharge itself from the power supply and should last 5 years or so; the 200-watt Senstron power supply has four device connectors. The system I evaluated came with a 1.2MB 5¼-inch Teac floppy disk drive, which is not spring-loaded, and a 20MB Seagate ST-225 hard disk. Although Seagate produces reliable hard disks, this one is slow—rated at 70 milliseconds. Since it will cost you an extra $400 over the base system price, I would recommend that you look elsewhere and get a better price—or a faster disk.

The basic $1,795 price includes DOS 3.3. The Award Software setup program, which is part of the Award BIOS, is encoded into 200-ns. EPROM chips and is accessible from the keyboard by pressing the Ctrl-Alt-Esc key combination.

The manual was away at the printer's at review time, so Arche sent me a typeset copy. The 54-page version I saw seems to be directed toward the novice: it's well written, contains lots of pictures and a good index, but has little in-depth technical information.

HOMEMADE Many components of the Arche Rival 286 are manufactured by Arche Technologies: the controller card can handle two floppy disk drives and two hard disk drives; the monochrome video adapter/printer card has a 9-pin TTL video port and a 25-pin parallel port; and the peripheral port card has another 25-pin parallel port and two serial ports.

The keyboard supplied with the system is Unitek's enhanced AT-style 101-key keyboard. It has a good, stiff, over-the-center feel though it can't really approximate the feel of an IBM keyboard.

The Arche Rival 286 is a consistently solid, although not spectacular, performer for its class. It sets itself apart with its aesthetic styling, quality construction, and a superior monitor. The only weak link in this otherwise solid system is the extremely slow (and optional) hard disk.

—Catherine D. Miller

Prime products

□ **3½" format available from us. Specify when ordering.**
◉ **package includes both 5¼" and 3½" disks.**
Ⓡ **3½" format available from manufacturer by request. Call us for details.**
CP—copy-protected, **NCP**—not copy-protected

SOFTWARE

We only carry the latest versions of products. Version numbers in our ads are current at press time.

Alpha Software ... NCP
□Keyworks 3.0 *(macros)* . . . . . $59.
□Advanced Keyworks 1.0 . . . . . 175.
□ALPHA/three 1.1 *(dB3 file compatible)* . . 219.
American Small Business Computers
□Design CAD 3.0 *(NCP)*. . . . . 159.
□Design CAD 3D 1.1 *(NCP)*. . . . . 159.
Application Techniquea ... NCP
ⓇPizazz Plus . . . . . 75.
Ashton-Tate ... NCP
□dBASE III Plus 1.1 . . . . . call
◉Rapidfile 1.2 . . . . . 219.
◉MultiMate Advantage II 1.0 299
□Master Graphics Pack *(includes Sign Master, Chart Master, Diagram Master)* . . . . . 299.
Best Programa ... NCP
□Label Master 3.1 *(mailing label program)* . . 29
Bible Research ... NCP
□THE WORD 4.0 *(specify KJV or NIV)* . . . . 159.
Bloc Development ... NCP
□FormTool 2.01 . . . . . 59.
Borland International ... NCP
□Sidekick 1.5 . . . . . 57.
□Turbo BASIC 1.1 . . . . . 67.
□Turbo C 1.5 . . . . . 67.
□Turbo Pascal 4.0 . . . . . 67.
□Superkey 1.1 . . . . . 67.
□Reflex 1.1 . . . . . 99.
□Eureka 1.0 . . . . . 109.
◉Sidekick Plus . . . . . 129.
◉Quattro 1.0 w/SQZ!Plus 1.0 . . . . . 159.
◉Paradox 2.0 *(easy-to-use database)*. . . . . call
Brodarbund ... CP
□Print Shop . . . . . 35.
□Print Shop Companion *(tools for Print Shop)* 33
□Memory Mate 2.0 *(NCP)*. 45
Chipsoft ... NCP
ⓇTally Ho 1.01 *(financial calculator)* 32
Computer Associates ... NCP
◉SuperCalc 4 1.1 . . . . . 299.
Crosstalk Communications ... NCP
□Crosstalk XVI 3.61 . . . . . 95.
□Crosstalk MK.4 1.0 . . . . . 129.
Dac Software ... NCP
□Dac-Easy Payroll 2.0 . . . . . 59.
□Dac-Easy Light 1.0 . . . . . 45.
□Dac-Easy Accounting 2.0 59
□Dac-Easy Bonus Pak 2.0 115

PC Connection Software Special
through July 31, 1988

Nolo Press ... NCP
□**WillMaker 3.0**

Now you can prepare your own valid will without a lawyer. Even the *American Bar Association Journal* called this "a nice, easy-to-use program." Following a simple question-and-answer format on-screen, in plain English, WillMaker allows you to:

- Leave specific items to your spouse, children, grandchildren, domestic partners, friends, and cherities
- Name a guardian to care for your minor children
- Create a trust for your minor children
- Easily update your will as necessary

For PC, XT, AT & PS/2. . . . . $35.

Digital Research ... NCP
□Gem Draw Plus 2.01 . . . . . 189.
□Gem Desktop Publisher 1.1. . . . . 259.
Executive Systems ... NCP
□XTREE Pro 1.0 69
5th Generation ... NCP
◉Fastback Plus 1.01 . . . . . 99.
Funk Software ... NCP
□Sideways 3.21 . . . . . 42.
◉Noteworthy 1.0 . . . . . 49.
◉Inword 1.0. . . . . 59.
◉Worksheet Utlities 1.0 . . . . . 59.
Generic Software ... NCP
◉Generic CADD Level 3 *(Drafting Enhancements & Auto Dimensioning included in program)* 109
□Dot Plot . . . . . 35.
□Basic Home Design. . . . . 35.
□Drafting Enhancements. . . . . 35.
Harvard Associatea ... NCP
PC LOGO 2.0 89
Hayes ... NCP
□Smartcom II 3.0. 89
Hilgreeva Software ... NCP
□HyperACCESS 3.2 . . . . . 89.
Individual Software ... NCP
◉Directory Assistance 1.0 . . . . . 33.
□Professor DOS *(with Smartguide)*. . . . 33.
□Typing Instructor II . . . . . 26.
Intuit ... NCP
□Quicken 2.0. . . . . 35.
Javelin Software ... NCP
□Javelin Plus 2.01 . . . . . 159.
Lifetree ... NCP
◉Total Word 1.0 259
MacroPac International ... NCP
101 Macros for
1-2-3 dBASE III Plus WordPerfect
Excel . . . . . *each* 42.

MECA ... CP
□Managing Your Money 4.0. . . . . $129.
Meridian Technology ... NCP
□CarbonCopy Plus 5.0. . . . . 119.
Microlytics ... NCP
□Gofer 1.0 *(text retrieval system)* . . . . . 45.
□Wordfinder 4.0 *(electronic thesaurus)*. . . . 35.
MicroPro ... NCP
□WordStar Professional Release 4.0 259
□WordStar 2000 Plus Rel. 3 *(Personal Ed.)* 259.
Microrim ... NCP
◉R:BASE for DOS (version 2.1) . . . . . 449.
R:BASE for OS/2 *(3½" disks only)*. . . . . 599.
Microsoft ... NCP
□Learning DOS *(for any version)* . . . . . 35.
□Windows 2.03 . . . . . 69.
◉Works 1.0. . . . . 119.
◉Windows 386. . . . . 129.
Bookshelf 1.0 *(CD-ROM)* . . . . . 199.
Bookshelf 1.0 w/Amdek Laser Drive . . . 799.
◉Word 4.0 . . . . . 209.
◉Excel 2.0 *(requires 80286/80386 CPU)* . . 319.
LANGUAGES
□Quick BASIC 4.0 . . . . . 69.
□Quick C 1.0. . . . . 69.
ⓇMacro Assembler 5.0 99
ⓇC Compiler 5.1 . . . . . 299.
Migant ... NCP
◉Ability Plus 1.0. . . . . 149.
Monogram ... NCP
□Dollars & Sense 3.1 . . . . . 105.
Nantucket Software ... NCP
◉Clipper *(Summer '87, dB3 Plus compiler)* 399.
New England Software ... NCP
◉Graph-in-the-Box Release 2. . . . . 75.
Nolo Press ... NCP
ⓇWillMaker 3.0 . . . . . special
North Edge Software ... NCP
□Timeslips III 3.2 . . . . . 115.
Owl International ... NCP
□Guide 2.0 . . . . . 143.
Paperback Software ... NCP
□VP-Planner Plus 2.0. . . . . 95.
□VP-Info 1.4 . . . . . 65.
□VP-Expert 1.2 *(expert system)* . . . 65
Paul Maca ... NCP
□Nvelope 1.01. 29
□H/Test-H/Format 2.0 *(hard-disk tools)* . . . 49.
□Mace Utilities 4.1 *(DOS utilities)* 59
Personics ... NCP
ⓇSmartNotes 2.0. . . . . 49.
ⓇSeeMORE 1.0. 49
Ⓡ@BASE 1.1 119
Petar Norton ... NCP
◉Norton Utilities 4.0. . . . . 55.
◉Norton Guides *(C, Assembler, Basic)*. each 55.
◉Advanced Utilities 1.0 . . . . . 85.
Quarterdeck ... NCP
□DESQView 2.01 *(operating environment)* . . 79
□Expanded Memory Manager 4.1. 39
Revolution Software ... NCP
◉Cruise Control 3.02 . . . . . 39.

For IBM Personal Computers exclusively.

PC CONNECTION®

ALL ITEMS SUBJECT TO AVAILABILITY PRICES SUBJECT TO CHANGE WITHOUT NOTICE

at perfect prices.

Simon & Schuster ... NCP
- ☐ Typing Tutor IV ... $33.

Softlogic Solutions ... NCP
- ☐ Software Carousel 2.02 *(everything resident)* 49.
- ☐ Disk Optimizer 4.0 ... 45.

Software Publishing ... NCP
- ◉ PFS:First Publisher 1.0 ... 59.
- ◉ PFS:First Choice 2.0 ... 89.
- ◉ PFS:Professional Write 2.0 ... 119.
- ◉ PFS:Professional File 1.01 ... 149
- ◉ Harvard Graphics 2.1 ... 299.
- ◉ Harvard Total Project Manager II ... 379.

Surpass Software Systems ... NCP
- ◉ Surpass 1.0 ... 297

Symantec/Turner Hall ... NCP
- Ⓡ Note-It Plus 2.0 ... 49.
- Ⓡ SQZ!Plus 1.01 ... 59
- Ⓡ 4Word 2.0 ... 59.
- Ⓡ 4Views 1.0 ... 59.
- ◉ Q & A Write 1.01 ... 119
- ◉ Grandview 1.0 ... 175.
- ☐ Q & A 3.0 *(database, word processor)* ... 209.
- ☐ *Breakthrough* Timeline 2.0 ... 289.

TOPS ... NCP
- *Flashcard (AppleTalk network card)* ... 169.
- NetPrint 1.08 *(share printers)* ... 119.
- TOPS 2.0 ... 119.

Traveling Software ... NCP
- ◉ LAP-LINK Plus 1.0 ... 85
- ◉ Desklink ... 99

True BASIC, Inc. ... NCP
- ☐ True BASIC 2.01 *(now includes Runtime)* ... 57.

Vericomp ... NCP
- ◉ SoftBytes 2.0 ... 35.
- ◉ SoftBytes 386^{MAX} 2.36 ... 49.

WordPerfect Corp. ... NCP
- ◉ WordPerfect Library 1.1 ... 59.
- ☐ WordPerfect 5.0 ... 255.
- ◉ DataPerfect 2.0 ... 299.

WordTech Systems ... NCP
- ☐ dBXL 1.2 ... 119.

Xerox ... NCP
- Ventura Publisher 1.1 ... 549

EDUCATIONAL

Barron's ... CP
- Computer SAT ... 35.

Stone & Assoc. ... NCP *(reqs. graph. brd.)*
- My Letters,Numbers,Words *(ages 2 to 6)* ... 27
- Kids Stuff *(ages 2 to 6)* ... 27

True BASIC, Inc. ... NCP
- Ⓡ Trigonometry ... 32.
- Ⓡ Algebra ... 32

RECREATIONAL

Accolade ... CP *(reqs. graphics brd.)*
- Ⓡ Hardball *(baseball simulation)* ... 11.
- Ⓡ Testdrive *(driving simulation)* ... 11.

Electronic Arts ... CP *(reqs graphics brd.)*
- Chessmaster 2000 ... 32.
- ☐ Chuck Yeager's Flight Simulator ... 32.
- Grand Slam Bridge ... 45.

Infocom ... NCP
- Hitchhiker's Guide ... 12.
- Leather Goddesses of Phobos ... 25.
- Zork Trilogy ... 33.

Microprose ... CP
- F-15 Strike Eagle *(requires CGA)* ... 22.
- Gunship *(requires CGA or EGA)* ... 32

Microsoft ... CP
- ☐ Flight Simulator 2.13 *(reqs. graphics brd.)* 35.

Mindscape ... CP
- ☐ Balance of Power *(reqs. graphics brd.)* ... 30

Parlor Software ... CP
- ☐ Bridge Parlor *(best Bridge simulation)* ... 49.

Sierra On-Line ... CP
- ◉ Leisure Suit Larry *(requires CGA or EGA)* .. 25.
- ◉ Space Quest *(requires CGA or EGA)* ... 33
- ◉ Space Quest II *(requires CGA or EGA)* ... 33
- ◉ King's Quest III *(requires CGA or EGA)*... 33.
- ◉ Police Quest *(requires CGA or EGA)*... 33.

Sphere, Inc. ... NCP
- ◉ Tetris *(addicting mind teaser)* ... 24.
- ◉ Falcon *(F-16 simulation, reqs. graphics brd.)* 32.

Subiogic ... NCP
- ☐ Jet 2.1 *(requires EGA or CGA)* ... 33

XOR ... NCP
- ☐ NFL Challenge ... 69

PC Connection Hardware Special
through July 31, 1988

Practical Peripherals ... 5 years
2400 Baud Internal & External Modems

The Practical Peripherals 2400 SA has been a best-seller with us for some time now. The reason? It delivers high quality data transmission, Hayes compatibility, and made-in-the-U.S.A. quality All at a terrific price.

- Hayes asynchronous compatible
- Compatible with virtually all current communications programs
- Separate line and set connectors to accomodate data and voice calls
- Automatic answer mode
- Made in the U.S.A.
- Full 5 year warranty

2400 SA (external modem) ... $181.
PM2400 (internal modem w/ProComm) 151.

1-800/243-8088

PC Connection 500M
6 Mill Street
Marlow, NH 03456
603/446-3383 **FAX** 603/446-7791

HARDWARE

Manufacturer's standard limited warranty period for items shown is listed after each company name. Some products in their line may have different warranty periods

AST Research ... 2 years
- I/O Mini 2 C/S/P ... $89.
- SixPakPlus 64k C/S/P *(now upgrades to 576k)* ... call
- SixPakPremium 256k C/S/P *(upgrades to 1 Meg or 2 Meg w/Piggyback)* call
- Advantage Premium 512k S/P *(upgrades to 1 Meg or 2 Meg w/Piggyback)* call
- Advantage 2 512k *(for PS/2)* ... call
- RAMpage! 286 512k *(upgrades to 2 Meg)* call
- Hot Shot 286 *(10 MHz)* ... 399.

Amdek ... 1 year
- 410A *(amber monochrome monitor)* ... 159.
- LaserDrive-1 *(CD-ROM Drive, 90-day wrty.)* 629.

Compucable ... 2 years
- 2-Position switch box ... 29
- 3-Position switch box ... 39

Cuesta ... 1 year
- Datasaver 400 Watt *(standby power unit)* 459.

Curtis ... lifetime
ACCESSORIES
- Disk Holder DB-1 *(holds 50 5¼" disks)* ... 8.
- Printer Stand PS-1 ... 18.
- Universal System Stand SS-3 ... 25.
- DS-1 Switch Box *(controls 2 printers)* ... 33.

CABLES
- Smartmodem-to-PC Cable *(9 feet)* ... 17.
- Printer-to-IBM cable *(9 feet)* ... 17.

SURGE SUPPRESSORS
- Safestrip SP-3 *(6 outlets; 1 year wrty.)* ... 21.
- Diamond SP-1 *(6 outlets)* ... 32.
- Ruby *(6 outlets; EMI/RFI filtered; 6 ft cord)* .. 59.
- Ruby-Plus *(w/FAX & modem protection)* ... 69.

DCA ... 1 year
- Irma 2 *(3270 emulation board)* ... 729.

Epson ... 1 year
We are an authorized Epson Service Center
- FX-86e printer *(80 column, 240 cps)* ... call
- FX-286e *(136 column, 240 cps)* ... call
- LQ-500 *(80 column, 180 cps)* ... call
- LQ-850 printer *(80 column, 264 cps)* ... call
- LQ-1050 printer *(136 column, 264 cps)* ... call
- LQ-2500 printer *(136 column, 324 cps)* ... call
- LX-800 printer *(80 column, 180 cps)* ... call
- *Printer-to-IBM cable (6 feet)* ... 15.

Everex ... 1 year
- 1200 Baud Internal Modem ... 99.
- 2400 Baud Internal Modem ... 199.

5th Generation ... 6 months
- Logical Connection 256k ... 349.
- Logical Connection 512k ... 409.

Hayes ... 2 years
- Smartmodem 1200 ... 299.
- Smartmodem 1200B *(with Smartcom II)* ... 299.
- Smartmodem 1200B *(no software)* ... 265.

For IBM Personal Computers exclusively.

PC CONNECTION®

*DEFECTIVE SOFTWARE REPLACED IMMEDIATELY DEFECTIVE HARDWARE REPLACED OR REPAIRED AT OUR DISCRETION

Call 800-243-8088.

Smartmodem 2400	$449.
Smartmodem 2400B *(with Smartcom II)*	449.
Hercules ... 2 years	
Graphics Card Plus	189.
Network Card Plus *(with TOPS DOS)*	349.
Intel ... 5 years	
2400B Modem 2 *(internal modem for PS/2 Models 50/60/80)*	279.
Inboard 386/PC w/1 Meg	725.
Inboard 386/AT *(req. installation kit)*	949.
Inboard Installation Kit *(specify computer)*	139.
Aboveboard 286 512k	389.
Aboveboard PS/286 512k S/P	419.
AboveBoard 2 Φk *(for MicroChannel)*	279.
8087 *(for IBM-PC & XT)*	114.
8087-2 *(for PS/2 Models 25 & 30)*	159
80287 *(for AT & XT286)*	195.
80287-8 *(for 8 MHz 80286 machines)*	249.
80287-10 *(for PS/2 Models 50 & 60)*	319.
80387 *(for 16 MHz PS/2 Model 80)*	499.
80387-20 *(for 20 MHz PS/2 Model 80)*	749.
Kensington Microware ... 1 year	
Masterpiece	94
Masterpiece Plus	109
key tronic ... 3 years	
101 Keyboard *(enhanced layout)*	99
Kraft ... 1 year	
Three-button Joystick	33
KYE International ... 1 year	
Genius Mouse Model GM-6 Plus	59.
Microsoft ... lifetime	
SPECIFY BUS OR SERIAL VERSION	
Mouse with Paintbrush	109.
Mouse with Easy CAD	125.
Mouse with Windows and Paintbrush	145.
Migent ... 1 year	
Pocket Modem *(1200 baud, incl. software)*	119.
MSC Technologies ... lifetime	
SPECIFY BUS OR SERIAL VERSION	
PC Mouse w/PC Paint +	89.
PC Mouse w/Autosketch	105.
NEC ... 2 years	
Multisync II *(800 x 560 max. resolution)*	call
NSI Logic ... 3 years	
Epic 480 *(extended EGA)*	135.
Smart EGA Plus *(supports 800x600 res.)*	169.
Orchid Technologies ... 2 years	
Tiny Turbo 286	289.
Designer VGA	349.
PC Cooling Systems ... 1 year	
REPLACEMENT POWER SUPPLIES	
Turbo Cool 150 *(run 25° - 40° cooler)*	129.
Turbo Cool 200 *(run 30° - 45° cooler)*	169.
Silencer 200 *(69% noise reduction)*	149.
Practical Peripherals ... 5 years	
Microbuffer Inline *(par print buffer w/32k)*	129
1200 Baud Internal Modem *(w/ProComm)*	69
1200 Baud External Modem	109
2400 Baud Internal Modem	special
2400 Baud External Modem	special
Princeton Graphics ... 1 year	
MAX-12E *(amber monochrome monitor)*	139.
Ultrasync *(supports CGA, EGA, VGA)*	$549.
Quadrsm ... 2 years	
ProSync *(with mouse)*	259.
Microfazer II Print Buffer 64k	249.
Quad386XT	859.
Toshiba ... 1 year	
P321SL printer *(80 col., 216 cps, w/tractor)*	529.
P351SX printer *(136 column, 216 cps)*	999.
T1000 Laptop *(80C88, 6.4 lbs., 5 hr. battery)*	call
T1200 Laptop *(80C86, 10 MHz, 20 Meg)*	call
T3100/20 Laptop *(80286, 8 MHz, 20 Meg)*	call
T3200 Laptop *(80286, 12 MHz, 40 Meg)*	call
T5100 *(80386, 16 MHz, 40 Meg)*	call
768k Ram Card for T1000	299.
Video 7 ... 2 years	
VEGA Deluxe *(supports 640x480)*	209.
VEGA VGA *(supports full VGA specs)*	287.

DRIVES

IOMEGA ... 1 year	
Bernoulli II Single 20 Meg Internal *(5¼")*	779.
Bernoulli II Dual 20 Meg External *(5¼")*	1679.
20 Meg cartridge *(5¼")*	59.
Bernoulli Box 40 Meg	1679.
20 Meg cartridge *(8")*	82.
PC2 Card	169.
PC2B Card *(bootable card)*	229.
PC4 Card *(for PS/2 Model 50/60/80)*	299.
Mountain Computer ... 1 year	
40 Meg Internal Tape Drive *(XT, AT or PS/2)*	379.
40 Meg External Tape Drive *(XT, AT or PS/2)*	479.
40 Meg External Tape Drive w/Power Supply *(XT, AT or PS/2)*	569.
Plus Development ... 1 year	
Hardcard 20 Meg *(49 ms)*	569
Hardcard 40 Meg *(39 ms)*	725.
Seagate ... 1 year	
FREE PCTV® Hard Drive Installation Tape with the purchase of 20 Meg Seagate drive for the IBM PC (not for AT). Specify Beta or VHS.	
20 Meg Internal Hard Drive ST225 *(w/controller and cables, 65 ms)*	299.
30 Meg Internal Hard Drive ST238 *(w/controller and cables, 65 ms)*	329.
40 Meg Internal Hard Drive for AT *(40 ms)*	439.
40 Meg Internal Hard Drive for XT *(w/controller and cables, 40 ms)*	499.
TEAC ... 1 year	
PC, XT 360k Drive *(5¼" half-height)*	99.
720k Drive *(3½" half-height, specify XT or AT)*	99.
Toshiba ... 1 year	
AT 360k Drive *(5¼" half-height)*	99.

1-800/243-8088

PC Connection
6 Mill Street
Marlow, NH 03456
603/446-3383 **FAX** 603/446-7791

500M

DISKS

All disks have a lifetime warranty.

5¼" DS/DD Disks for PC & XT *(360k)*	
Fuji MD2D *(10 disks per box)*	$12.
Sony *(10 disks per box)*	12.
Maxell MD2-D *(10 disks per box)*	13.
Verbatim Datalife *(10 disks per box)*	13.
5¼" DS/High Density Disks for AT *(1.2 Meg)*	
Fuji MD2HD *(10 disks per box)*	22.
Sony *(10 disks per box)*	23.
Maxell MD2-DD *(10 disks per box)*	23.
Verbatim Datalife *(10 disks per box)*	22.
3½" DS/DD Diskettes *(720k)*	
Sony *(10 disks per box)*	18.
Fuji *(10 disks per box)*	19.
Maxell *(10 disks per box)*	20.
3½" DS/High-Density Diskettes *(1.44 Meg)*	
Fuji *(10 disks per box)*	55.
Maxell *(10 disks per box)*	59.

MISCELLANEOUS

CompuServe	
CompuServe Information Service	24.
Grolier's OnLine Encyclopedia	32.
Cables ... lifetime	
Smartmodem-to-AT cable *(9 feet)*	15.
Parallel Printer cable *(15 feet)*	19.
PC Connection Computer Toolkit	22.

OUR POLICY

- We accept VISA and MASTERCARD.
- No surcharge added for credit card orders.
- Your card is not charged until we ship.
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order (in the U.S.).
- No sales tax.
- All U.S. shipments insured, no additional charge.
- APO/FPO orders shipped 1st Class Mail, charged by weight.
- Allow 1 week for personal and company checks to clear.
- COD max. $1000. Cash, cashier's check, or money order.
- 120 day limited warranty on all products.*
- To order, call us anytime Monday thru Friday 9:00 to 9:00, or Saturday 9:00 to 5:30. You can call our business offices at 603/446-3383 Monday through Friday 9:00 to 5:30.

SHIPPING

Note: Accounts on net terms pay actual shipping.

Continental US:

- For monitors, printers, Bernoulli Boxes, and computers, pay actual charges. Call for UPS 2nd-Day & Next-Day-Air.
- For all other items, add $3 per order to cover UPS Shipping. For such items, we automatically use UPS 2nd-Day-Air at no extra charge if you are more than 2 days from us by UPS ground.

Hawaii:

- For monitors, printers, Bernoulli Boxes, and computers, actual UPS Blue charge will be added. For all other items, add $3 per order.

Alaska and outside Continental US:

- Call 603/446-3383 for information.

For IBM Personal Computers exclusively.

PC CONNECTION®

©COPYRIGHT PC CONNECTION, INC., 1988. PC CONNECTION, PCTV AND THE RACCOON CHARACTERS ARE REGISTERED TRADEMARKS OF PC CONNECTION, INC., MARLOW, NH

PC Pride.

It's not Greek to us. By Jove.
The town of Marlow, NH (pop. 553) is steeped in myth and tradition. Even as we speak, our Herculean mascots are celebrating the Summer Olympiad by running and jumping their frivolous little hearts out. Meanwhile, we ordinary mortals continue to set new world records for sales and support of award-winning programs and peripherals.

Hit us with your best shot.
(Or, the myths of mail order).
Back in the days of yore, not-so-perspicacious PC pundits proclaimed that no mail order house could have enough pride to satisfy serious customers. They said the big bears of retail would crush our humble enterprise and we'd return to the sidelines with our flag in tatters. Since then we've vaulted, sprinted, jumped, dived, bumped, spiked, and generally hurdled ourselves headlong into the hearts and minds of PC users all over the world.

We've known the thrill of victory when your ports are pumping and performance is perfect. But, we also know the agony of defeat when your jumpers aren't jumping and your disks fall short. That's why our intrepid team of sales consultants is always in training to reach new heights of after-sale support.

Gopher! The gold, please.
When you go to trade shows you need something to trade and something to show, right? Well, how about the PC Connection Raccoon Pride Pin? You probably won't want to trade this soon-to-be-if-not-already-valuable memento of microcomputer mastery. But you will want to show it off. Get one of your very own with an order of $500 or more between now and July 31st.

Just call 1-800/243-8088 or 1-603/446-3383, M-F 9:00 to 9:00; Saturday to 5:30. If you're planning to visit please call ahead.

Display your PC Pride with a special pin featuring our own classy cloisonne and bound-for-glory mascots. Offer not available to net accounts. One per customer.

For IBM Personal Computers exclusively.

PC CONNECTION®

©COPYRIGHT PC CONNECTION, INC., 1988. PC CONNECTION AND THE RACCOON CHARACTER(S) ARE REGISTERED TRADEMARKS OF PC CONNECTION, INC., MARLOW, NH.

CORE INTERNATIONAL

Core ATomizer

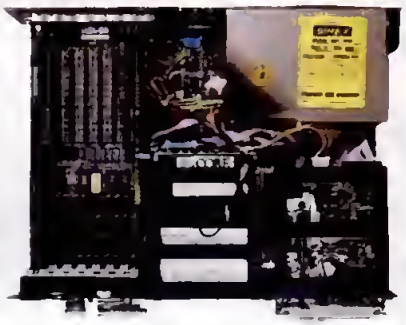
In the past few years we have seen AT compatibles marketed by companies that are well known for making other things like monitors, printers, and even cars. Now consider the long-awaited revision of the ATomizer, from Core International, a maker of high-performance hard disks.

Core has taken its advanced disk drive technology and fed it into an AT clone with positive results. At $1,350, the ATomizer comes with 512K RAM; a 1.2MB 5¼-inch floppy disk drive; one parallel and one serial port; a combination floppy/hard disk controller; an IBM Enhanced-style keyboard; and six 16-bit and two 8-bit expansion slots. There is room for two more exposed half-height storage devices and one full-height disk drive. The 21-inch system unit is extremely sturdy and somewhat bulky; you may want to try to put it under your desk.

The ATomizer operates at a switchable 6, 8, or 12 MHz and contains the Phoenix BIOS, Version 3.06. Memory on the motherboard can be expanded to 4MB using 1MB chips, and additional memory can be included on expansion boards up to the 16MB limit.

HIGH-CAPACITY HARD DISKS The Core HCR controller card is specially equipped to run high-capacity hard disks and contains circuitry that can support hard disks using a 1-to-1 interleave. The HCR controller also passes information to and from the disks much faster than a normal ESDI/506 controller (like the one in the IBM PC AT) would. In order to take full advantage of the HCR controller, you should use a high-capacity disk. Obviously, Core offers a number of different disk choices: some are aimed at those looking for a good buy, while others are geared toward those whose main concern is real

Core International's rugged ATomizer is a full-size 12-MHz AT compatible that, as you might expect, turned in the best hard disk performance times of the machines reviewed here. Inside, the standard AT-like eight-slot configuration is found.

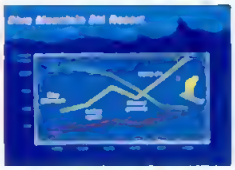


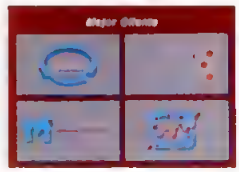
PC MAGAZINE FACT FILE

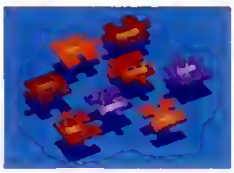
Core ATomizer
Core International
7171 N. Federal Hwy.
Boca Raton, FL 33487
(305) 997-6055
List Price: With 512K RAM, one 1.2MB 5¼-inch floppy disk drive, DOS 3.3 or Xenix, $1,350; 40MB hard disk, $876; monochrome monitor and card, $285; 14-inch EGA monitor and card, $600.
In Short: A reliable, fast, 12-MHz machine with powerful mass-storage capabilities from a company known for its big, fast hard disks. The system is sturdy, with plenty of room for one or more full-height disk drives. An ideal machine for applications that require high capacity and speed.

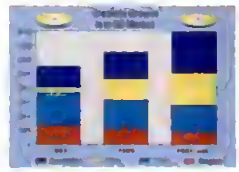
CIRCLE **681** ON READER SERVICE CARD

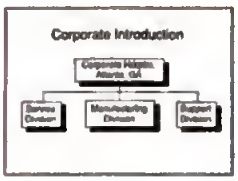
Of all the graphics you can create with Freelance Plus,

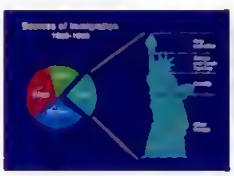


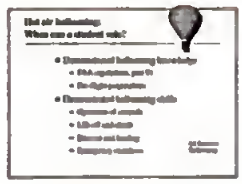


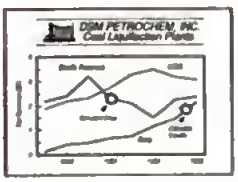


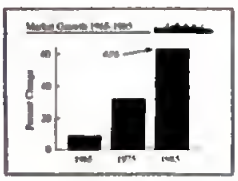












speed, the kind Core is famous for.

If you order an ATomizer equipped with a hard disk from Core, all you have to do is specify whether you'll be using DOS, OS/2, or Xenix. Core will low-level-format the hard disk and run setup by request. Core does not supply a copy of the operating system with each unit, but you can purchase one separately.

■ You pay a little more for the Core disk drives, but in return you get a machine that offers reliability, data security, and speed.

Our evaluation unit contained a Core Optima 40MB hard disk ($876) with DOS 3.21 installed. It also included a respectable Mitsubishi-made 14-inch EGA monitor and adapter card ($600), bringing the total cost of the evaluation unit to $2,826. The ATomizer performed the benchmark tests with no major problems and finished first in disk testing.

The keyboard shipped with the evaluation unit was an 84-key, AT-style keyboard that had a mushy feel to it, but a representative said that Core now ships only 101-key, Enhanced-style keyboards with the ATomizer. The new keyboard did not arrive in time for evaluation, but it can only be better than the other keyboard.

The documentation is basic enough to guide new users through installation and setup and advanced enough for more-experienced users. Bundled with each ATomizer is Core's own Corefast backup and file management utility, as well as a Core utilities disk.

Included with the ATomizer are several manuals that contain separate sections for installing and configuring the disk drives, getting started with the Corefast backup program, and even instructions on upgrading for Novell software when using a Core disk drive.

TECH SUPPORT If you encounter any problems when configuring the ATomizer, Core offers free technical support for the length of the warranty. The warranty for the ATomizer system unit is 1 year; for a Core disk drive, 3 years. Extended 2- or 3-year warranties for the ATomizer ($200 and $350) are available.

When the unit is returned for repairs, Core pays the shipping one way. Problems with the system unit are fixed by third-party maintenance technicians, but if the Core disk drive is the problem, Core will replace it (for free if the problem occurs within the 3-year warranty period).

Based on price and performance, the ATomizer is a good buy. Even when you add the price of a hard disk, monitor, and adapter card, the system is a reasonable $2,800 to $3,000. You pay a little more for the Core disk drives, but in return you get a machine that offers reliability, data security, and speed.—**Greg Alwang**

DATAWORLD

Dataworld Data 286

The Data 286 from Dataworld, the southern California–based mail-order firm, is a zero-wait-state, 12-MHz machine with 512K of 60-nanosecond RAM, and a 12-inch EGA monitor and card. The Data 286 costs $1,605 and comes in a full-size system box, 6½ by 19½ by 16½ inches (HWD), the advantage being the full complement of eight expansion slots: six 16-bit and two 8-bit. One of the 16-bit slots holds the hard/floppy disk controller.

The zero-wait-state memory setting is very fast, and Dataworld has chosen to ensure memory reliability with faster-than-normal RAM chips. While other vendors typically install 80-ns. chips for 12-MHz zero-wait-state machines, Dataworld uses more-expensive and faster 60-ns. chips. According to Dataworld, the 60-ns. chips have a better chance of working well under the high-heat situations that often occur in full-size boxes stuffed with expansion cards.

SWITCHING WAIT STATES If you want to switch between zero wait states and one, it's easily accomplished with a rear-mounted toggle switch. Other conveniences include front-panel buttons to switch between the 12-MHz turbo mode and the slower 8-MHz speed for products that don't work at higher speeds.

All of the internal components are either industry standards or acceptable substitutes. The finish work is of fine quality, and the box suitably rugged. The 200-watt power supply has four power lead device connectors and includes a switched outlet in which to plug a monitor power cord.

The Data 286 uses the ubiquitous Phoenix 80286 ROM BIOS, in this case Version 3.07/00. Phoenix setup software is also included, although the IBM Advanced Diagnostics setup program works as well.

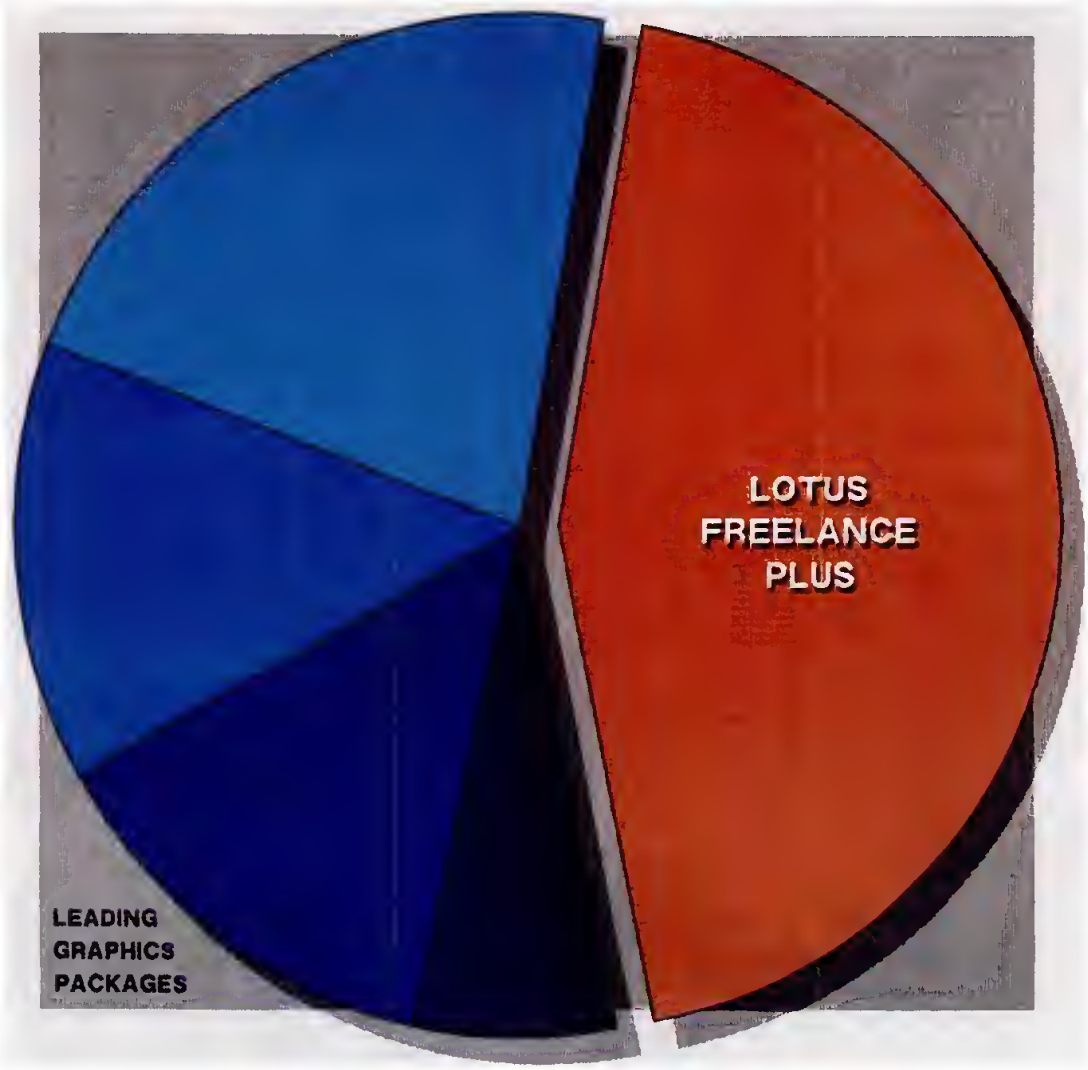
The Data 286's keyboard is of the IBM Enhanced style and is manufactured by Focus Electronics. The keyboard is particularly good and a pleasure to work with. It has a reasonable amount of tactile feedback, good travel, and a reassuring click. It feels especially sturdy.

Neither DOS nor any version of BASIC comes standard with the Data 286, as it does with all the other machines reviewed here except for the Star Industries AT 286. The only software included is the setup program, so when you compare prices be sure to add $99 for DOS and BASIC. A helpful booklet has fairly clear descriptions of system switch and jumper settings. The booklet also has an accurate line drawing of the motherboard and electronic

PC MAGAZINE FACT FILE

Dataworld Data 286
Dataworld
3717 San Gabriel River Pkwy.
Pico Rivera, CA 90660
(800) 722-7702
(800) 722-7734 (in Calif.)
(213) 695-3777
List Price: With 512K RAM, one 1.2MB 5¼-inch floppy disk drive, 12-inch EGA monitor and card, $1,605; 40MB hard disk, $585; 512K memory upgrade, $150.
In Short: A fairly standard AT compatible that runs at speeds of up to 12 MHz at zero wait states. Very-high-speed 60-nanosecond memory chips help ensure reliable performance. The price is right, but service is available only on the West Coast.
CIRCLE 680 ON READER SERVICE CARD

This is the one we're particularly proud of.



Lotus® Freelance® Plus is the most versatile graphics package for the PC. And that's probably why it's the #1 selling business graphics package on the market.*

Freelance Plus lets you create everything from data-driven charts like bar charts, to graphics based on ideas like flowcharts. And Freelance Plus is the complete graphics solution, because you get all the tools you need for creating effective business graphics in a single package.

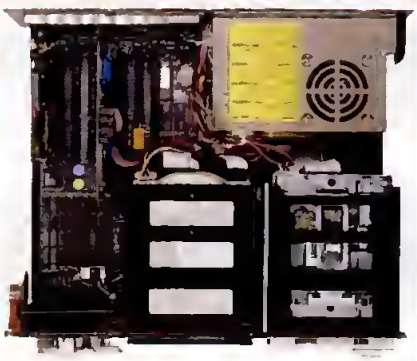
What's more, Freelance Plus is compatible with other Lotus software, like 1-2-3,® Symphony,® and Manuscript.® And it's incredibly easy to use.

Find out why Freelance Plus has the biggest slice of the pie. To order a $10 demo kit, call 1-800-345-1043 and ask for demo kit ADW-1658. Lotus Freelance Plus

*Based on national audits conducted by Audits & Surveys, Inc., May-December 1987

© 1988 Lotus Development Corporation Lotus, 1-2-3, Symphony, Manuscript and Freelance are registered trademarks of Lotus Development Corporation.

The Dataworld Data 286 offers 12-MHz speed and excellent compatibility in a full-size chassis that may be hundreds of dollars less expensive than other AT compatibles. A system with a 40MB hard disk and an EGA monitor can cost as little as $2,190.



components, a measure of detail other vendors sometimes omit. A 40-page user manual covers the system's installation and setup procedures.

Dataworld machines need to be shipped to the West Coast for service. The vendor pays for ground shipping one way, and its service department tries for a 3-day turnaround. If you call with a service problem and the technicians are able to determine the faulty component over the phone, they'll have you take the suspect piece out of your machine (if you feel capable) and ship it west, which costs less for both sides. The system comes with a 1-year warranty for parts and labor.

The bonus for accepting the potential service inconvenience is price. Our evaluation unit, complete with EGA card and monitor and the 40MB hard disk, was priced at $2,439. You get a high degree of AT compatibility, faster memory chips than from most vendors, and several convenient features in a full-size box for significantly less than you would pay for other, name-brand computers at local dealers.—**Bruce Brown**

EPSON AMERICA INC.

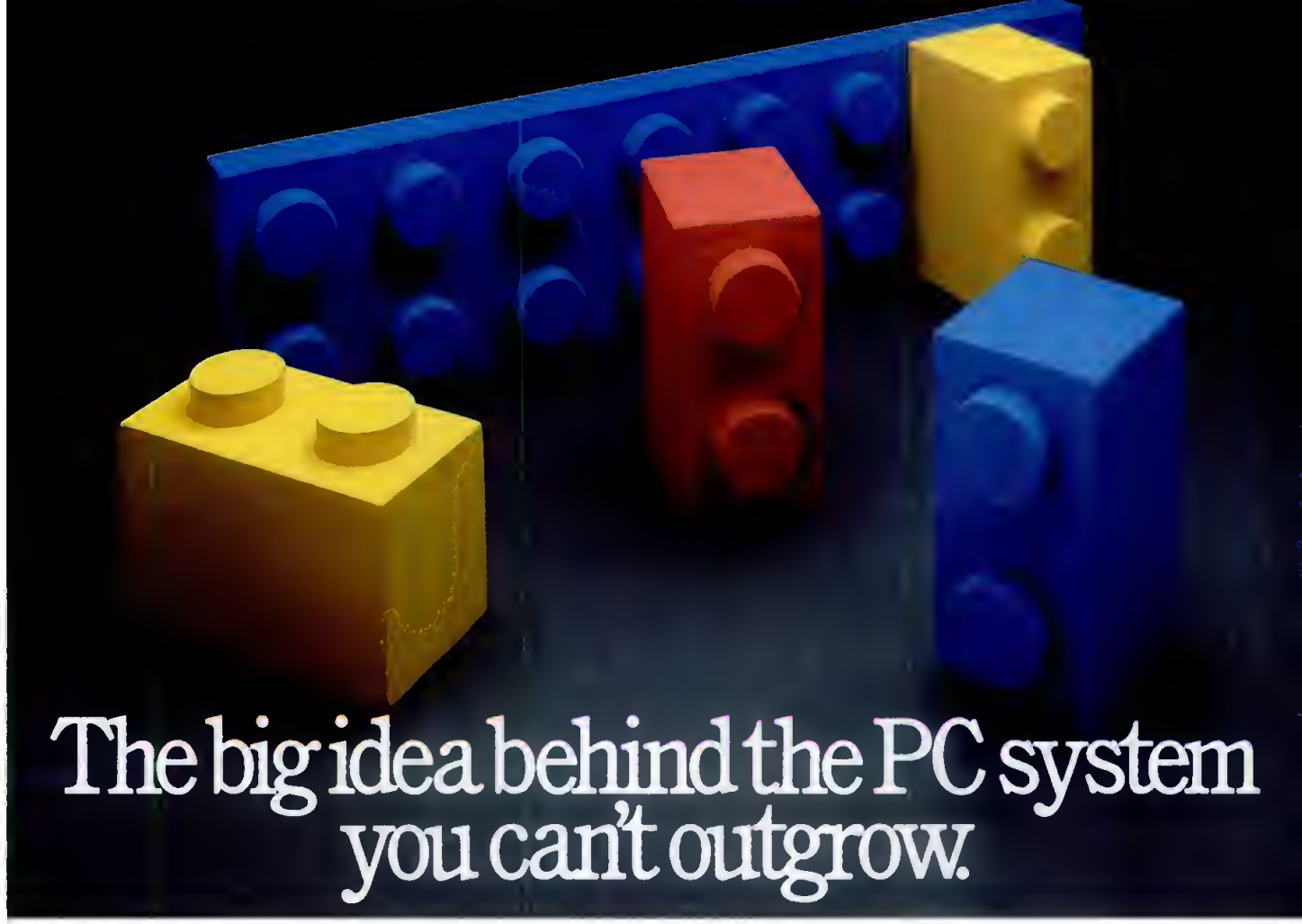
Epson Equity II Plus

Epson America keeps right on rolling with new products and product updates. The Epson Equity II Plus is the latest version of Epson's small-footprint, all-purpose 80286 computer. With a base price of $1,595, the 10-MHz Equity II Plus is $500 cheaper than Epson's top-of-the-line Equity III Plus, which gives you more expansion slots, faster operation, a bigger box, and a top operating speed of 12 MHz.

For your $1,595, Epson gives you a 640K, 8/10-MHz, one-wait-state AT compatible. Configured with a 40MB hard disk and an EGA monitor, the price of the system is $3,643. The Equity II Plus completed all of our benchmark tests handily and achieved the speed performance scores its clock and wait-state setting would suggest. There are no surprises here, which is good news in a developed product niche that should be predictable but often isn't.

The Equity II Plus's system box is a small unit, 6.1 by 15.7 by 16.3 inches (HWD), that weighs 19.8 pounds. It doesn't take up much room on your desk, but if you put the 7.7-inch-deep keyboard in front of the system unit, you'll need a minimum desk depth of 24 inches plus some room in back for cables.

The computer is good looking but doesn't call attention to itself with any particularly startling exterior features. Inside the box, however, the power switch mechanism looks pretty silly. There is a long metal arm that extends from the front-mounted power switch to the back of the



The big idea behind the PC system you can't outgrow.

We call it Modular Systems Architecture™: a building block approach that protects your PC investment against obsolescence. It makes upgrading Wyse PCs a snap—literally. Because we've put all computing functions, even the CPU and its microprocessor, on plug-in boards. So as your needs grow, you can easily upgrade our 8 MHz AT compatible to a 12.5 MHz high performance 286, or even a 16 MHz 386. When more powerful microprocessors are available, you'll even be able to upgrade our top-of-the-line 16MHz WYSEpc 386.

The WYSEpc 386: exceptional memory speed plus processing speed make it one of the most powerful PCs made.

Introducing SystemWyse.™ Wyse PCs are themselves building blocks in a comprehensive system for creating solutions. They link effortlessly with our terminals, monitors, and expansion boards in integrated solutions of exceptional quality and value, using industry standard software. And SystemWyse is backed by the company that sells more terminals than anyone but IBM.

It's this easy to upgrade the CPU and boost the power of a SystemWyse PC.

The big idea, above all, is to adapt more readily to change than any other PC system. Because survival belongs not merely to the fittest, but to those who remain fittest, longest.

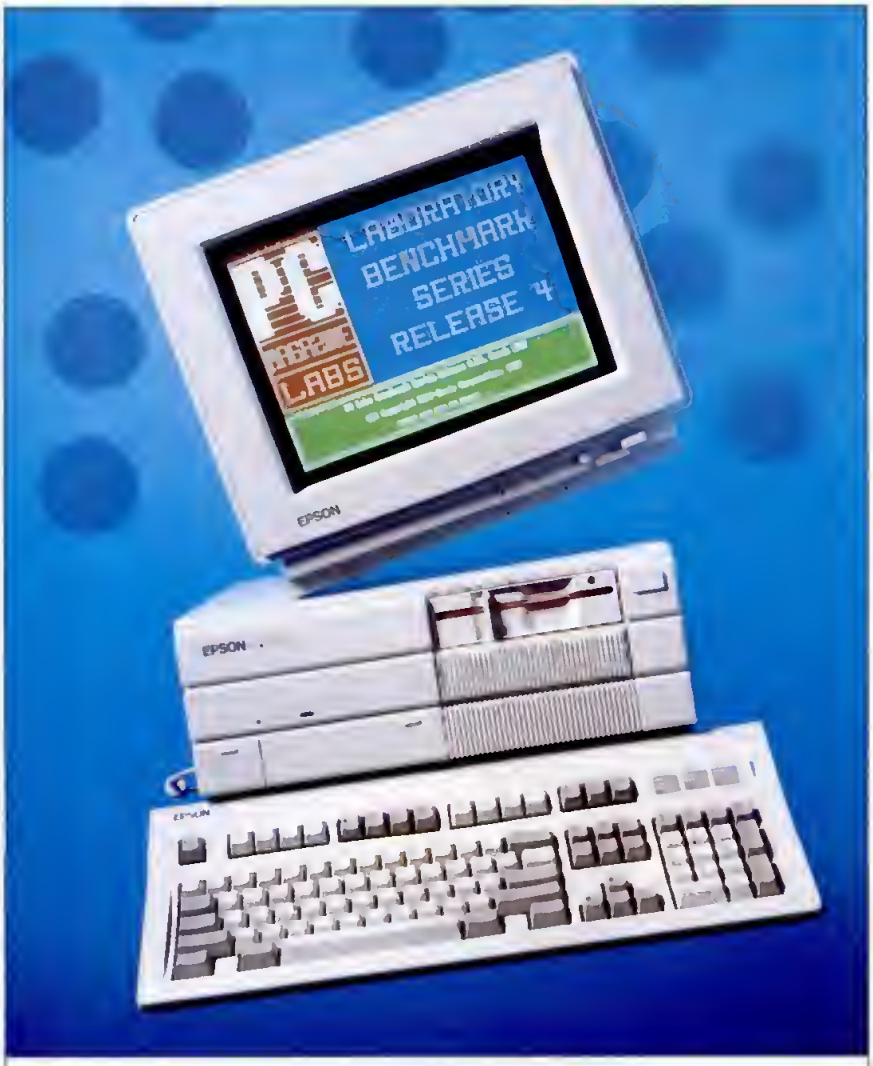
Call for more information. **1-800-GET-WYSE**

WYSE

We make it better, or we just don't make it.

WYSE® is a registered trademark of Wyse Technology. SystemWyse, WYSEpc 386, and Modular Systems Architecture are trademarks of Wyse Technology. IBM is a trademark of International Business Machines. Screen: Boeing Graph.

CIRCLE 734 ON READER SERVICE CARD



The Epson Equity II Plus is a small-footprint, 10-MHz AT compatible. Inside, note the separate controllers for the floppy disk drive and the hard disk, and the long arm that extends from the on/off switch in front of the machine to the power supply in the back.

PC MAGAZINE FACT FILE

Epson Equity II Plus
Epson America Inc.
2780 Lomita Blvd.
Torrance, CA 90505
(213) 539-9140
List Price: With 640K RAM, one 1.2MB 5¼-inch floppy disk drive, $1,595; with 40MB hard disk, $2,795; monochrome monitor and card, $248; RGB monitor and card, $568; EGA monitor and card, $848.
In Short: A small-footprint, 10-MHz system with quality components, most—including the BIOS—manufactured by Epson. The only markedly different components are separate floppy and hard disk controller cards that eat up an extra slot. Sold and serviced through dealers, so discounts can be found and service is close by.

CIRCLE 679 ON READER SERVICE CARD

machine and pushes a button on the 140-watt power supply. The mechanism seems out of place in an otherwise cleanly designed machine.

Configuring the Equity II Plus with the supplied Set-Up software is simple. It involves making selections from a single screen menu that lists options in pop-up windows. The Set-Up utility on IBM's AT Advanced Diagnostics disk also works.

The Equity II Plus is available with a variety of disk drive units. A 1.2MB 5¼-inch half-height floppy disk drive is standard with the system; a 360K 5¼-inch and a 720K 3½-inch floppy disk drive are optional. The only hard disk option is the 28-millisecond CDC 40MB hard disk that Epson also sells with the Equity III Plus. There is space in the system unit and power hookups for up to three half-height drive or tape devices.

INSIDE THE BOX You get just six expansion slots with this unit (three 16-bit and three 8-bit), though they are probably enough for most single users. The standard interface card includes the controller for the floppy disk drive and parallel and serial ports. It takes one of the 8-bit slots. If you add a hard disk to the Equity II Plus, you have to use a separate hard disk controller. The evaluation unit came with a Western Digital controller for the CDC hard disk.

The IBM Enhanced-style keyboard is

FINISH FINANCIAL WORK FIVE TIMES FASTER.

ALL NEW! For Business and Home

Quicken finishes all this in under 5 minutes!

Introducing Quicken® Version 2—absolutely the fastest, easiest way to write checks, keep financial records, track income and expenses, budget, and manage your cash flow. It's ideal for business and personal use.

Now, Finish Financial Chores in Seconds.
Quicken completes your financial work 5 to 8 times faster than ever before:

- Analyze budget vs. actual expenses by month for 12 months: 4 seconds
- Look up a check you wrote 1000 checks ago: 1 second
- Write and print 20 checks and update all records: 3 minutes
- Compile an itemized list of tax deductions for the year: 3 seconds

How can it be so fast? Quicken uses indexed files and speed-optimized C and assembler code — the very latest in high-speed technology.

So Automatic, It Eliminates Work.
Quicken's fully automatic "macros" eliminate repetitious clerical work. Macros

Quicken remembers the bills you forget.

remember your bills, print your checks, and update all records automatically. All you do is sign the checks.

In fact, Quicken is so automatic it reminds you to pay your bills even if you forget to use it! Simply turn on your hard disk PC, and Quicken's pop-up Billminder™ appears when you need to pay bills.

No Need to Alter Your Bookkeeping Procedures.
Quicken is easy to use because it works just like your checkbook. There's no need to change your bookkeeping format or learn anything new—no accounting jargon, no "debits," no "credits."

Quicken also comes with comprehensive on-line help, a complete manual, and free technical support.

Here's what the critics say:

"I've never seen such an easy-to-use manual or software that's so simple to use." *Martin Blumenthal, inCider Magazine*

"Extremely simple and fast." *Esther Dyson, Industry Analyst*

"Absolutely the best small accounting program made." *Bob Schwabach, Universal Press Syndicate*

New Features for Business.
Quicken provides special sections for businesses covering payables, receivables, cash flow forecasting, payroll, petty cash control and job, client, and property bookkeeping.

If you're a doctor, property manager, accountant, consultant, or manage any type of small business, and you write checks, Quicken will save you time and money starting today.

Free 30-Day Trial.
Try Quicken. If you're not 100% satisfied, return it within 30 days and pay nothing.

Specifications
Software Compatibility: Exports data and reports in ASCII. Also exports in Lotus® format with optional Transfer Utility
Hardware Compatibility: All IBM® PC, AT,® PS/2® and compatibles with 256K RAM and DOS 2.0 or higher. All printers. All monitors. Also available for Apple® IIe, IIc and GS with most of the same features
Capacity: Number of bank accounts: unlimited. Number of transactions: unlimited. Maximum amounts: $9,999,999.99. Number of income/expense categories: 250 with 256K, thousands with 512K RAM
Other: Not copy protected. Checks are approved for all financial institutions in the U.S. and Canada

Quicken $49.95

NOT COPY PROTECTED

Try Quicken for 30 Days Free! If not completely satisfied, return Quicken within 30 days for a full refund (including $3.00 shipping and handling charge).

Call 800 624-8742
(in California call 800 468 8481)

Or send coupon with payment to: Intuit, 540 University Ave., Palo Alto, CA 94301

☐ Check enclosed (No purchase orders)
☐ Visa ☐ MasterCard ☐ Amex

Card No. _____ Exp. _____

Name _____

Address _____

City _____ State _____

Zip _____ Phone _____

☐ Quicken, $49.95 plus $3.00 shipping & handling. CA residents add sales tax.
☐ IBM version ☐ Apple II version
☐ 5¼" disk ☐ 3½" disk
☐ Transfer to Lotus Utility (optional), $19.95

Current Quicken owners—Call our 800 number for upgrade information.

Intuit PC07788

merely all right, with reasonable response and feel. The keyboard isn't good enough to rave about, but it won't keep you from buying or using the machine, either. Like other Epson machines, the Equity II Plus has the keyboard plug on the left front side of the system unit, an improvement over the more common back-of-the-box location.

Epson usually supplies extensive documentation for its products, and the Equity II Plus is no exception. Three thick manuals cover the included MS-DOS 3.2, GW-BASIC, and a user guide and diagnostics. *SpeedStor* hard disk backup software also comes standard.

Epson produces its own BIOS, which passed all of our compatibility tests. The only feature on the whole machine that is different from the norm is the separate floppy and hard disk controller cards.

One of the best things about the Equity II Plus is its manufacturer. While many AT-class machines have to be shipped across the country for service or cared for by regional service centers, Epson is a standard brand name and its computers are generally sold through dealers who also supply support and service.

The Equity II Plus is neither the fastest nor the fanciest AT-class machine. Epson positions this unit as an all-purpose machine for end users who need middling 80286 power but don't want to give up a lot of desk space. If you need 12-MHz speed or nine slots, Epson is happy to sell you the Equity III Plus, but many users need look no further than the Equity II Plus.—**Bruce Brown**

The small footprint of the Hyundai Super-286C is achieved by slicing out two expansion slots and mounting the half-height hard disk vertically. The $1,499 machine comes standard with an EGA Wonder Card and one parallel and two serial ports.

HYUNDAI ELECTRONICS AMERICA

Hyundai Super-286C

Hyundai markets the Excel—its fast-selling import econocar—as the best possible combination of price and features. There are cheaper cars (if you want to call the Yugo a car), but Hyundai claims that you won't find a better deal when you consider all of the Excel's standard equipment.

The same philosophy seems to be behind Hyundai's economy computer, the Super-286C. With a base price of $1,499, it's several hundred dollars more expensive than the cheapest AT compatibles.

INTRODUCING THE MOST POWERFUL, "ALL IN ONE" LOOP 286 COMPUTER

LOOP 88

- ★ Intel BOBB Base System.
- ★ 4.77 — 10 MHz Clock Speed
- ★ 640K Memory on Board
- ★ Hard & Software Switchable
- ★ 8 Slots
- ★ ERSO BIOS
- ★ 150W Power Supply
- ★ One Teac 360K Floppy Drive
- ★ Floppy Drive Controller.
- ★ AT Type Keyboard (84 Keys)

BASE SYSTEM $539

ALL SYSTEMS WITH:

- One Year Limited Warranty.
- 72 Hours Burn in Work.
- Fully Assembled & Tested Assurance in U.S.A.
- 30 days money back guarantee.
- FREE UPS ground in U.S.A.
- Major cradit cards acceptable.

LOOP 286

- ★ Western Digital 286 Main Board
- ★ Western Digital BIOS
- ★ 1 MB Memory on Board
- ★ 1 Wait State
- ★ 0 Wait State Available
- ★ One 1.2 MB Floppy Drive
- ★ 200W Power Supply
- ★ Enhanced Capacity Keyboard (101 Keys)
- ★ Case Dimension 17" • 16" • 6"
- ★ Best Quality Guarantee

BASE SYSTEM $1335

1 Built-in Intel® 12.5 MHz 80286 Microprocessor 0 or 1 wait states available. Fully IBM AT® compatible. Uses latest surface mount technology by Western Digital.

2 Built-in 1 MB of DRAM at 256K x 9 SIMM. Expandable to 4MB

3 Built-in single chip Paradise PEGA video controller. Supports up to 640 x 480 resolution, 16 colors from a palette of 64 , EGA, CGA, MOA, Hercules® and Plantronics Colorplus™ compatible. Simulates color with 16 shades on monochrome monitors.

4 Built-in single chip floppy disk controller. Supports up to 4 single, double or high density 3.5 or 5.25 inch drives.

5 Built-in single chip hard disk controller. Can operate two ST/506 or ST/412-based disk drives using MFM (Modified Frequency Modulation) data encoding format with 32 Bit ECC (Error Correction Code).

6 Built-in 2 serial ports through 10 pin headers. 1 Centronics parallel port through 26 pin header.

7 Built-in PS/2® compatible mouse port.

8 Built-in expansion slots—3-16 BIT AT BUS and 1-8-BIT PC BUS. Automatic bus decoupling eliminates compatibility problems with 8 MHz add on cards.

9 Built-in CMOS clock calendar with built-in system configuration information.

10 Built-in 80287 math co-processor slot.

CALL SPECIAL PRICE FOR HARD DISK, MONITOR, TAPE BACK-UP, CO-PROCESSOR & MODEM

QUALIFIED CORPORATION & UNIVERSITY P.O. ACCEPTABLE. DEALER INQUIRY WELCOME.

ORDER HOT LINE: 1-800-521-4892

IN CALIFORNIA: 1-714-937-1670

VERTEX
Advanced Research, Inc.

CIRCLE 329 ON READER SERVICE CARD

COMMITMENT TO BEST CUSTOMER SUPPORT AND SERVICE

1820 Orangewood Ave., Ste. 203, Orange, CA 92668

Copyright

COMPLETE 386 TOWER
WITH 64MB HARD DRIVE!

ZEOS 386 TOWER. NEW, FAST AND POWERFUL. THE INDUSTRY'S MOST UNBELIEVABLE VALUE. BELIEVE IT.

STANDARD FEATURES INCLUDE:

- Genuine 32-bit Intel 80386, 6/16 MHz Keyboard selectable.
- Zero-Wait CACHE using 64K of SRAM.
- 1 MB of 32-bit RAM on board. System expandable to *16* MB.
- 64 MB Miniscribe Hard Drive coupled with Adaptec's 2372 *ultra high speed* controller; 1:1 interleave, 800 KB/sec transfer rate!
- 1.2 MB High Capacity Floppy Drive.
- Disk Caching Software for further enhancement of disk performance.
- Deluxe heavy-duty tower case with six half-high drive openings.
- High-Res 12" Non-glare Amber Display, Tilt & Swivel base, Hercules compatible Adapter supporting up to *132* columns.
- 101 Key Enhanced Keyboard, Pleasant "Tactile/Click" Feel.
- Clock/Calendar with Battery Backup. Serial and Parallel/Printer Ports.
- 6-16 and 2-8 bit AT-compatible I/O slots. 287/387 Math Coprocessors optional.
- Fully compatable with virtually *all* XT/AT and 386 software.

Our *complete* 386 Tower. With a 64 MB hard drive. 1 Megabyte of ZERO wait memory expandable to 16 Megabytes. Monitor, keyboard, drives and controllers, all of the highest quality—everything and more for only $2,995. How can it be?

ONLY $2995.00

Because it's ZEOS, that's how. Your ZEOS 386 Tower comes to you factory direct, fully assembled, burned-in and tested in our own laboratories. Every system is built to order. Custom built actually, right to your own specifications. And talk about performance, *compare these test results* using PC Labs Benchmark Series Release 4:

	NOP	80386 Instruction Mix	Floating Point Calculation	Conventional Memory
ZEOS 386/16 Tower	2.1	3.6	13.6	0.5
ZEOS 386/20 Tower	1.7	3.0	10.8	0.4
IBM PS/2 Model 80-071	2.1	4.4	15.6	0.6
Compaq Deskpro 386/16	2.1	4.0	15.5	0.8

When you compare speed, compare quality and compare value you'll find your ZEOS 386 Tower *is* the Benchmark! We have many other drives and options too. They include:

- EGA color upgrade with auto switch controller. Fully tested. Add only $495.
- 20 MHz upgrade. Add $500.
- High capacity drives, tape back-ups and many more options.

For details call 800-423-5891.

Order now with confidence. Your ZEOS 386 Tower comes with a Full One Year Limited Warranty and our 30 day Full Refund Satisfaction Guarantee. Call now, 800-423-5891.

CIRCLE 721 ON READER SERVICE CARD

ORDER NOW TOLL FREE
800-423-5891

FAX Orders Dial: 612-633-2310
In Minnesota Call: 612-633-4591
MasterCard, VISA and C.O.D.
Also see the ZEOS 286 in this issue

ZEOS INTERNATIONAL, LTD.

PS/2, XT and AT are trademarks of IBM Corporation. Deskpro is a trademark of Compaq Computer Corporation. Prices are subject to change without notice. Call for complete warranty details. ZEOS is a publicly traded company; NMS: ZEOS. 530 5th Avenue NW, St. Paul, MN 55112

PC MAGAZINE FACT FILE

Hyundai Super-286C
Hyundai Electronics America
4401 Great America Pkwy.
Santa Clara, CA 95054
(408) 980-7561
List Price: With 640K RAM, one 1.2MB 5¼-inch floppy disk drive, DOS 3.2, EGA Wonder Card, $1,499; with second floppy disk drive, $1,599; with 30MB hard disk, $1,999; with two floppies and hard disk, $2,099; 14-inch monochrome monitor, $250, EGA monitor, $308.
In Short: A small-footprint, 10-MHz AT compatible that offers good quality for a good price. Standard EGA Wonder card is an advantage, as are motherboard-mounted ports
CIRCLE 678 ON READER SERVICE CARD

But the system comes in a nearly complete configuration, unlike other clones whose base prices don't include such "luxuries" as ports and a video card.

LOADED MOTHERBOARD The Super-286C's motherboard has two serial ports, a parallel port, and a floppy disk drive controller built in. That should take care of I/O needs for most users, and it frees the expansion slots that would normally be devoted to I/O and the floppy disk controller.

A clock/calendar is also standard equipment, and the Super-286C comes with ATI's EGA Wonder monitor card. EGA support is an unusual feature to find as standard equipment, and it's even more surprising to find a name-brand component sitting in the slot. The EGA Wonder is one of the most widely sold EGA cards, and it offers auto-switching to accommodate different monitors and software.

To complete your Super-286C system, you need only add a monitor and a hard disk to go with the standard 1.2MB 5¼-inch floppy disk drive. A 14-inch monochrome monitor adds $250 to the price, while an EGA display will set you back $308 over the base configuration price. A 30MB hard disk brings the system price (less monitor) to $1,999.

Our tested configuration, with an amber monochrome monitor and a 30MB RLL Seagate hard disk, had a total price of $2,249.

The Super-286C is a small-footprint system, measuring 6 by 15⅞ by 16¼ inches (HWD). The Hyundai's smaller width accommodates a total of six expansion slots (four 16-bit, two 8-bit)—two fewer than the IBM PC AT. That's a consideration, but the motherboard-based ports and floppy disk controller lessen the need for additional slots.

The system's hard disk is mounted on its side, next to the cage that encloses the floppy disk drive bays. This somewhat unusual arrangement allows for installation of a second half-height floppy disk drive under the standard floppy, if desired.

Hyundai supplies the Super-286C with a relatively puny 135-watt power supply. That should be big enough to handle most peripherals, but a fully loaded bus might make the power supply wheeze a bit. Several other machines in this price class offer power supplies in the 190- to 200-watt range.

The Super-286C runs at keyboard-selectable clock speeds of 8 or 10 MHz. The usual Ctrl-Alt-Plus or -Minus key sequence changes speeds. The ROM BIOS is by Award Software, a name seen more and more often on clone motherboards.

BENCHMARK RESULTS In processor benchmark testing, the system performed in the normal range for a 10-MHz machine, 1.2 to 1.3 times faster than a standard IBM PC AT. I encountered some fairly strange results, however, in running our hard disk BIOS Seek test. The drive generated too many errors for the results to be useful. On an alternate test, which uses DOS calls instead of BIOS calls, the drive clocked in at an access time of 69.79 milliseconds, which is serviceable if not speedy. The problem with the BIOS speed test may have been related to the drive's use of RLL technology. In any event, in actual practice the drive performed without incident.

A few other minor annoyances marred my impression of this basically sound machine. The power switch is rear mounted, which prevents accidental shut-down but makes for blind groping when a cold boot is in order. The supplied keyboard, which mimics the IBM Enhanced layout, has a mushy, imprecise feel. Typing on it was tolerable but hardly a pleasure.

The overall construction quality of the Super-286C seems quite high. Add-in cards fit snugly into the expansion slots, and the machine has an overall air of solidity that's missing from many compatibles.

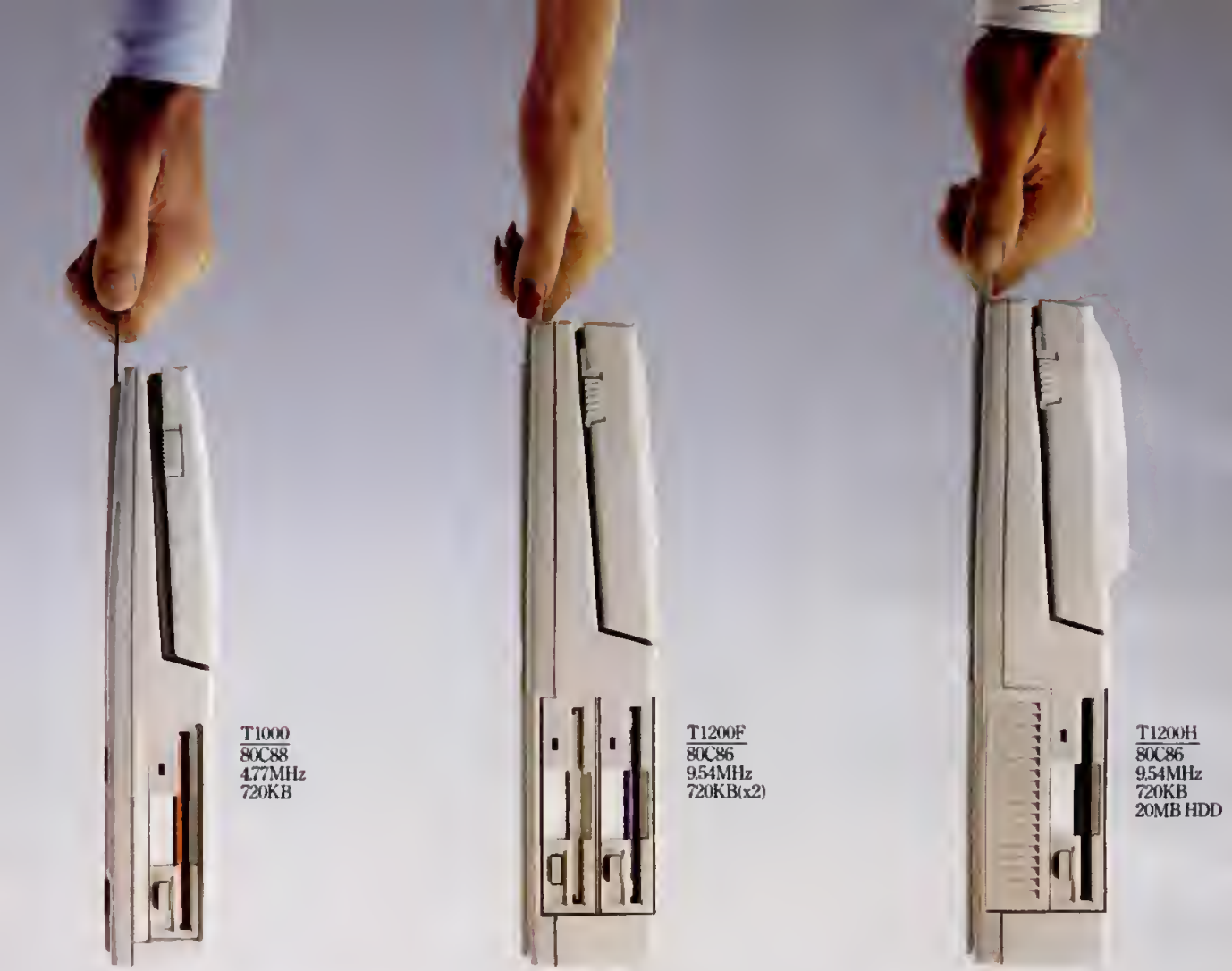
Hyundai is one of the giants that are making Korea's presence felt worldwide. The size and reputation of the company are reassuring when you are plunking down over $2,000 for a computer. Beyond that, the Super-286C has much to recommend it on its own merits. It's a very good system for the money.—**Jonathan Matzkin**

KAYPRO CORP.
Kaypro 286

Kaypro Corp. has made a point of not following in the paths of others. Its latest AT compatible may not be made with exactly the same recipe as most 286 machines, but it is certainly capable of grabbing a chunk of the pie. The Kaypro 286 is a 12-MHz machine that has a lot to offer, even though, like the Amdek System 286A, it strays from the norm. It's marked by a pretty hefty price tag, but it also offers a convenient upgrade path.

For $2,995, the Kaypro 286 comes with 1MB RAM; one 1.2MB 5¼-inch floppy disk drive; a 40MB hard disk (Fujitsu, Miniscribe, or NEC); one parallel and one serial port; a combination floppy/hard disk controller; an IBM Enhanced-style Maxi-Switch keyboard; and an adequate 12-inch Samsung monochrome monitor and card. At first glance, the Kaypro 286 looks like an IBM PC-XT, but after closer inspection it's easy to see that looks aren't everything. The dimensions are the same, and four half-height drive bays are accessible from the front of the unit, but that's where the comparison ends.

INSIDE STORY To pop the hood off the system unit, you have to remove 11 screws. After looking at the inside of the 286, you can see that Kaypro has taken a somewhat different approach in organizing the internals of the machine. Most noticeable is the missing motherboard. Like the Amdek System 286A, the Kaypro 286 takes advantage of slot technology and places all the motherboard components on a full-length microprocessor board. This



Obviously, We Believe In

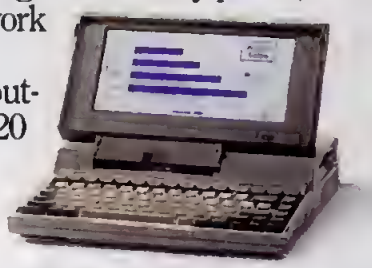
When it comes to portable PCs, we think that numbers should speak for themselves.

Perhaps that's why we have the largest number of high-powered, highly-portable PCs on the market today. All of which are IBM-compatible. All of which have industry-standard 3½" disk drives, full function keyboards and a vast array of built-in ports. All squeezed into packages as easy to carry as a briefcase.

The T1000, for example, weighs a mere 6.4 pounds, yet boasts MS-DOS® in ROM, a 720KB 3½" disk drive and an optional 768KB memory card which can be configured as EMS memory or a battery-backed RAM disk.

Our T1200H, on the other hand, has the distinction of packing a 20MB hard disk, a backlit screen and 1MB of RAM into a tidy 11-pound package. We also make an economical dual floppy disk version known as the T1200F that weighs just under 10 pounds.

And thanks to rechargeable battery power, all three are ready to work wherever you go.



For even more computing power, the T3100/20 is one of the smallest PCs with an 80286

Strength In Numbers.

microprocessor and an easy-to-read gas plasma display. It gives you a wealth of power and a 20MB hard disk in a trim 15-pound package.

Our T3200 goes even further, with two IBM-compatible internal expansion slots, a 40MB hard disk, an EGA plasma display system and up to 4MB of memory. Still, it only weighs a scant 19 pounds.

Finally, there's our powerful T5100, which at less than 15 pounds has all the best features of our other portables, plus an 80386 microprocessor for unmatched versatility and speed. And for a limited time, your T5100 purchase entitles you to buy Paradox 386,® Borland's powerful database software for only $299 (which is nearly $600 off the retail price).

And to all those numbers, we'd like to add one more: 1-800-457-7777. With it, you can find out even more about Toshiba's full line of computers and printers.

In fact, it's one call that ought to be your number one priority.

All Toshiba PCs are backed by the Exceptional Care program (no-cost enrollment required). IBM is a registered trademark of International Business Machines Corp. MS-DOS is a registered trademark of Microsoft Corp. Paradox is a registered trademark of Borland Corp.

In Touch with Tomorrow

TOSHIBA

Toshiba America Inc., Information Systems Division

Benchmark Tests: Low-Cost ATs

There were few surprises in the processor benchmark-test results. All three 10-MHz machines performed similarly, as did five of the six 12-MHz machines. The Amdek System 286A, with its 12.5-MHz clock speed, was a step ahead of the pack.

The Star Industries AT 286, the Arche Rival 286, and the Hyundai Super-286C were equipped with hard disks that didn't perform nearly as well as the others did but helped to keep the price of their systems' tested configurations down. In the case of the Star Industries machine, hard disk performance was compromised by an 8-bit hard disk controller. Conversely, the Core ATomizer sported an excellent 40MB drive that outperformed all the competition. Anything less from a company that is primarily a manufacturer of mass storage devices would have been a disappointment.

Performance Times

(Times given in seconds except where noted)

	NOP	80286 Instruction Mix	Floating-Point Calculation	Conventional Memory	File Access	DOS Disk Access (milliseconds)	BIOS Disk Seek (milliseconds)
8-MHz IBM PC AT	4.17	8.96	35.60	1.32	15.06	42.54	37.20
Epson Equity II Plus	3.35	7.08	27.95	1.02	11.16	29.99	27.61
Hyundai Super-286C	3.35	7.08	28.01	0.99	14.24	69.79	N/A
Star Industries AT 286	3.35	7.14	28.01	1.04	51.47	71.93	68.09
Arche Rival 286	2.80	5.89	23.40	0.88	14.75	81.22	69.23
Core ATomizer	2.80	5.82	23.12	0.85	11.09	29.73	18.95
Dataworld Data 286	2.80	5.82	23.18	0.84	11.44	33.02	30.35
Kaypro 286	2.75	5.83	23.12	0.85	11.21	35.54	33.70
Mitac Paragon 286F	2.75	5.82	23.17	0.82	13.13	35.01	32.26
Amdek System 286A	2.69	5.77	22.52	0.82	10.87	41.25	27.50

N/A—Not applicable: test could not be completed without errors.

The **NOP** benchmark test is designed to measure raw clock speed and memory access time while minimizing differences in microprocessors and the effect of memory caching. This test executes almost nothing but NOP ("No Operation") machine code instructions in a big 128K loop.

The **80286 Instruction Mix** benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 80286 instruction code. These instructions are a subset of the total processor instruction set.

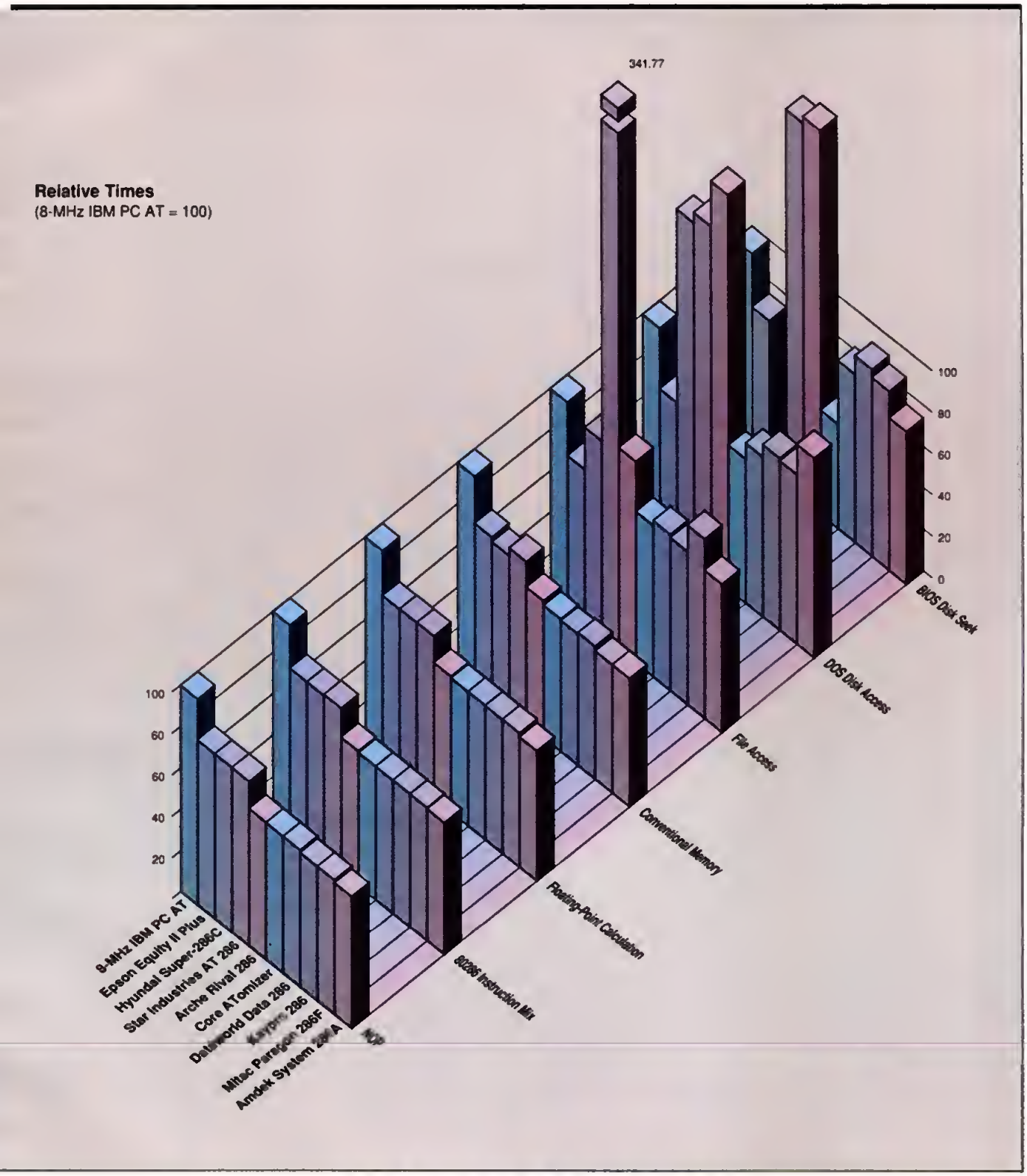
The **Floating-Point Calculation** benchmark test measures processor speed by looping through a series of floating-point calculations, including multiplication, division, exponentiation, and logarithmic and trigonometric functions. The benchmark program uses the floating-point library included with Microsoft C Compiler 4.0.

The **Conventional Memory** benchmark test allocates 256K of conventional memory and treats it as a series of 64-byte records. Then, 16,384 random records are read into and written from this memory. The result shown is the average of the read and write times.

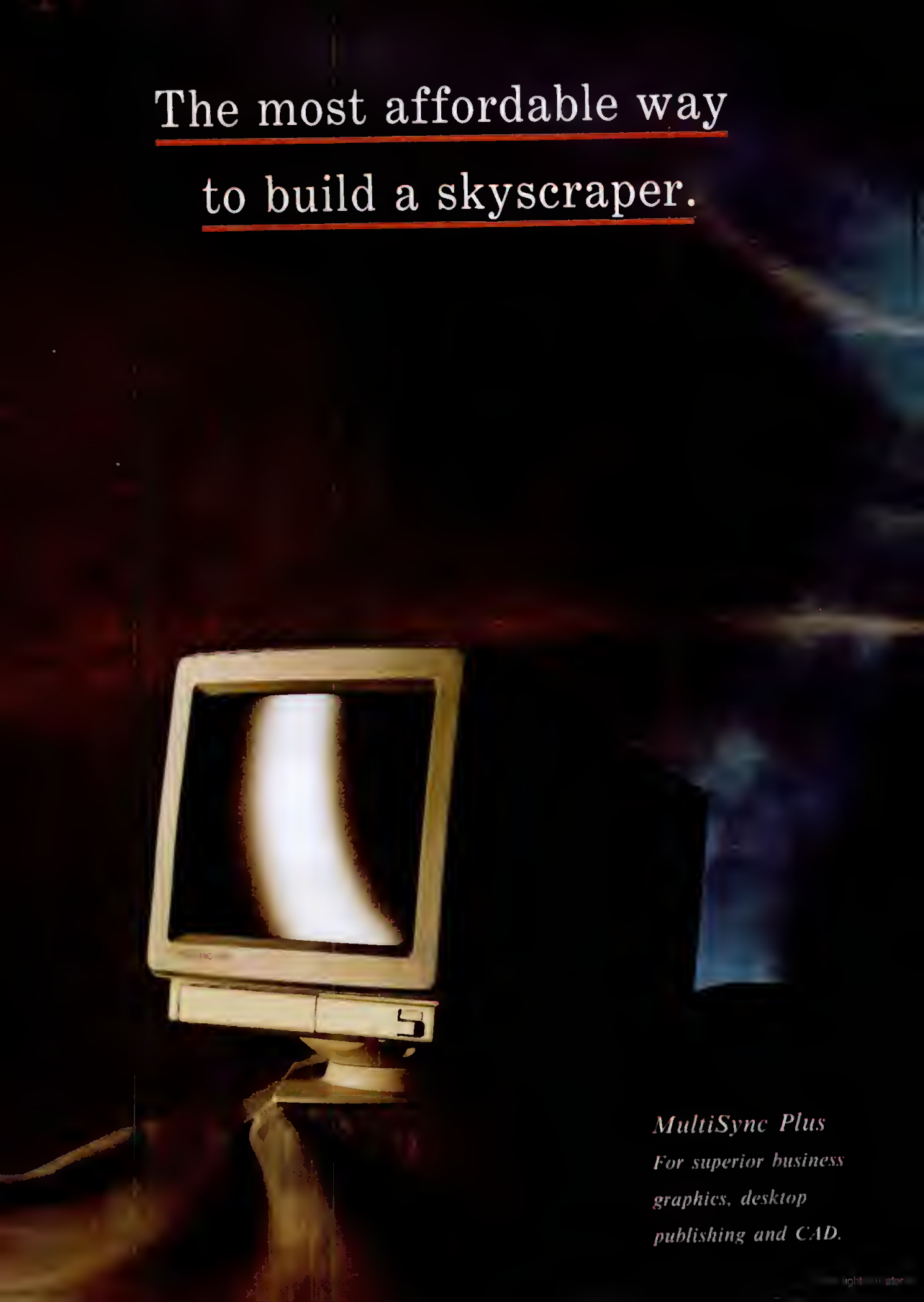
The **File Access** benchmark test measures the time it takes to sequentially create and write a 256K data file using record lengths of 512 bytes and 4K. The test program then performs a series of operations: a sequential read of the same file, a random write, and a random read.

The **DOS Disk Access** benchmark test measures the time it takes to do a random sector read using DOS. DOS buffers are set at 3 and the interleave factor is left at the drive's default setting. This test adds DOS's overhead to the BIOS and hardware times. The test program performs the sector read 1,000 times within the DOS disk partition. The average result is shown in milliseconds.

The **BIOS Disk Seek** benchmark test measures the time it takes to do a random seek using the disk's ROM BIOS. The test result includes minimal software overhead and may not parallel the manufacturer's claimed average access time. The test program performs 1,000 seeks. The average result is shown in milliseconds.


Relative Times
(8-MHz IBM PC AT = 100)
341.77
100
80
60
40
20
0
BIOS Disk Seek
DOS Disk Access
File Access
Conventional Memory
Floating-Point Calculation
80286 Instruction Mix
100
60
60
40
20
8-MHz IBM PC AT
Epson Equity II Plus
Hyundai Super-286C
Star Industries AT 286
Arche Rival 286
Core ATomizer
Dataworld Data 286
Mitac Paragon 286F
Amdek System 286 A

The most affordable way to build a skyscraper.



MultiSync Plus

For superior business graphics, desktop publishing and CAD.

Or construct a bridge. Or design a circuit. Or even create a pie chart. With the MultiSync® Plus, high resolution graphics are well within reach. When used with the graphics board that was designed for it—the MVA 1024 from NEC—it may well be the ultimate value for all your CAD and business graphics applications.

MultiSync Plus has a 15" diagonal flattened CRT and a tilt-swivel base to make you more comfortable. It works with boards for a variety of systems, from PC/XT/AT/386 (or 100% compatibles) to MAC II and PS/2. It automatically adjusts its scanning frequency from EGA to VGA, and on up to even higher standards with our MVA 1024 in AT/386 based systems.

Whether your plans are as big as a skyscraper or as small as a memory chip, MultiSync Plus makes the world of high resolution graphics more accessible. For literature or a dealer call

IBM PC XT AT and PS/2 are registered trademarks of the International Business Machines Corporation

1-800-447-4700. For technical details call NEC Home Electronics

Apple and Mac II are registered trademarks of Apple Computer Inc

(USA) Inc. 1-800-NEC-SOFT.

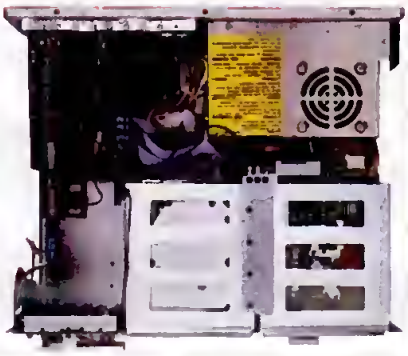
NEC is a registered trademark of NEC Corporation

C&C
Computers and Communications

NEC®

CIRCLE 115 ON READER SERVICE CARD

Like the Amdek System 286A, the Kaypro 286 features a backplane design, putting the 80286 processor on an expansion card and allowing for future upgrades. The $2,995 machine includes a monochrome monitor and a 40MB hard disk.



PC MAGAZINE FACT FILE

Kaypro 286
Kaypro Corp.
533 Stevens Ave.
Solana Beach, CA 92075
(800) 4-KAYPRO
List Price: With 1MB RAM, one 1.2MB 5¼-inch floppy disk drive, 40MB hard disk, 12-inch monochrome monitor and card, DOS 3.21, $2,995. EGA monitor and card, $575.
In Short: A 12-MHz machine with its motherboard components located on a full-length expansion card that leaves the possibility of an easy 386 upgrade wide open. The $2,995 price tag seems high, but the system is complete and includes quite a pile of software.

CIRCLE 677 ON READER SERVICE CARD

approach may seem a little strange at first, but it makes upgrading your microprocessor a breeze.

There are nine expansion slots available: five 8-bit and four 16-bit. Three 8-bit and two 16-bit slots are left after the system board, video card, I/O card, and controller are installed. The controller is a National Computer Ltd. combination controller and the BIOS is Phoenix, Version 3.07. A toggle switch and reset button are located on the back of the machine to either switch between 6 and 12 MHz or reset the computer.

The most unusual (and the most likable) feature of the Kaypro 286 is its separate microprocessor board. You have to like this feature after you discover how easy it is to upgrade your machine. Imagine just plugging a 386 microprocessor board into your 286 machine and instantly having 386 speed. With the Kaypro 286 it's possible and just over the horizon. As of this writing, Kaypro is in the process of developing a 386 upgrade board specifically for the 286 model. The upgrade board is expected sometime in the second quarter.

The Kaypro 286 performed all the benchmark tests with no problems and finished right up with the other 12-MHz machines tested. The 40MB hard disk had an average access time of 31 milliseconds. The only problem we had was getting the keyboard to work, but after switching to another Enhanced-style keyboard, we were up and running.

Bundled with the Kaypro 286 is a pile of software as tall as the computer. Besides MS-DOS 3.21, you also get *WordStar Professional*, Release 4.0; *WordFinder; SpeedStor;* and GW-BASIC. You'll also find several Kaypro utility programs that include a menu program that allows new users to set up menu choices for performing various DOS housekeeping tasks. Kaypro adds a nice touch by including two blank high-density floppy disks along with the many software programs.

Vision is the power of imagination. Seeing beyond the obvious. Being able to grasp and comprehend the obscure.

Introducing IZE™ to realize greater vision.

The information age has presented virtually every field, from research, education, and government to law, medicine, and business, with powerful resources. Resources that, unlike traditional data-based information, are textual. Lacking structure, this ever-growing textbase is most often unexplored, untapped power.

IZE is software designed to automatically discover the underlying structure of textbase resources and provide users the power to tap, explore, manage, and organize them.

The look of IZE is familiar: a table of contents presented in outline form. Yet the power of this elegant structure is considerable. And transparent in use.

Randomly entered reports, proposals, research abstracts, presentations, and correspondence. Ideas, lists, and notes. Documents you've already created and those you'll generate in the future. Imported information from on-line services. Plus any other text capable of being read by an IBM® PC or compatible system, can now be easily viewed in a different light.

IZE will create a fundamental change in the way you use your computer. And the way you use information.

To gain mastery over new resources. To grasp. To comprehend. To see. To focus. To create. To fully utilize the product of the information age.

The promise of IZE is greater vision to share your vision with the rest of the world.

persoft®

For more information about IZE, please contact your software dealer, phone us at 1-608-273-6000 or write Persoft Inc. 465 Science Drive Madison Wisconsin 53711 USA

© 1988 Persoft Inc. All Rights Reserved. IZE is a trademark of Persoft, Inc. Patents Pending. IBM is a registered trademark of International Business Machines Corporation

CIRCLE 366 ON READER SERVICE CARD

Aside from software, there is also plenty of documentation to guide you through assembling, using, and ugrading your Kaypro 286. The user guide contains a useful tutorial to familiarize new users with the different aspects of the computer.

DEALER NETWORK Unlike many other compatibles, Kaypro machines are not available through distributors. Kaypro uses independent dealers to sell its systems. So, if you need to have your Kaypro 286 serviced, call your dealer. The warranty period for the 286 is 1 year, and Kaypro will pay for the shipping one way. Kaypro also provides a toll-free tech support line.

The Kaypro 286 is built with the future in mind. Kaypro tries hard to please and does a good job. Today the Kaypro 286 gives other 286 machines in its class a run for their money. Its big advantage is that tomorrow it may be running in the 386 pack.—**Greg Alwang**

STAR INDUSTRIES

Star Industries AT 286

If you want quality, you're going to have to pay for it, right? Well, not always. Take the Star Industries AT 286. Here's a 10-MHz AT compatible with a lot of power and flexibility. Unlike some other compatibles, this one offers you the best of both worlds: quality at a very affordable $895 base price.

Unlike some other inexpensive compatibles, the Star AT 286 has a solid chassis with well-integrated components, all in a small-footprint box. The interior of the system unit looks like a scaled-down version of the IBM PC AT and holds no real surprises. The AT 286 comes equipped with 512K RAM on the motherboard, one 1.2MB 5¼-inch floppy disk drive, one parallel port, a monochrome video adapter, a built-in clock/calendar, a Western

With a base price of $895, the Star Industries AT 286 is one of the least expensive AT compatibles we've seen. The 10-MHz system tested by PC Labs included a monochrome monitor and a 30MB hard disk for a total price of $1,273. Hard disk performance was slowed by an 8-bit controller.

PC MAGAZINE FACT FILE

Star Industries AT 286
Star Industries
7655 E. Redfield Rd., #8
Scottsdale, AZ 85260
(800) STAR-286
(602) 483-2854
List Price: With 512K RAM, one 1.2MB 5¼-inch floppy disk drive, $895; 30MB hard disk, $299, monochrome monitor and card, $79, EGA monitor and card, $508.
In Short: An inexpensive, small-footprint, 10-MHz machine that features standard components and a good keyboard. The 8-bit hard disk controller hurts hard disk performance.
CIRCLE **675** ON READER SERVICE CARD

Datacopy Grayscale Scanners: Now you can put gallery quality photographs in all your publications.

The best imaging in a desktop scanner comes from Datacopy. Now you can merge finely detailed photographs and other artwork directly into your desktop publications.

HIGH RESOLUTION

Datacopy's complete range of scanners delivers the ultimate in high-resolution imaging.

With advanced grayscaling capabilities and 300 or 400 dot-per-inch quality graphics, Datacopy Scanners clearly outperform all other products in their price class.

VERSATILE SOFTWARE

Datacopy Scanners are supported by equally powerful software. PC*Image*™ allows you to capture grayscale, then

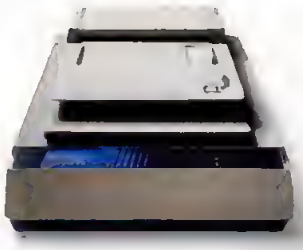
manipulate a scanned image to fit your own format. And merge that image with your current desktop publishing package.

What's more, Datacopy OCR Plus™ and OCR 4mat™ software can handle text and numerical data too. So you can scan the most popular types of hard copy information. And format

them for your current word processing, spreadsheet or desktop publishing programs. Quickly and easily.

QUICK INFORMATION

Call us today. We'll furnish you with information on our complete line of scanners and software. And where to find the nearest Datacopy reseller. **(800) 821-2898**



DATACOPY

THE EYE OF THE COMPUTER™

The Eye of the Computer, OCR Plus, OCR 4mat and PC*Image* are trademarks of the Datacopy Corporation.

CIRCLE 247 ON READER SERVICE CARD

PC MAGAZINE EDITOR'S CHOICE

- Amdek System 286A
- Arche Rival 286

There were no real disappointments in this group of nine AT compatibles; in fact, all are acceptable choices. Two machines stand out in the crowd. The Amdek System 286A is a system of superior quality with an obsolescence-proof processor-on-a-card design. You'll pay handsomely for this machine—$3,595 for 1MB RAM, a 40MB hard disk, and no monitor—but you won't be disappointed.

Those with smaller budgets should investigate the Arche Rival 286. This machine came out of nowhere but will make a name for itself with its $2,195 price tag and outstanding flat-screen monochrome monitor. The hard disk that Arche offers isn't good enough for the rest of the system, so order the base system, install your own favorite hard disk, and you'll have an AT compatible to brag about.

As you shop for your AT compatible, keep in mind some of our other recent Editor's Choices. The CompuAdd Standard 286/10 was the best of the 21 inexpensive 286 machines that we evaluated in February (see "The Cheapest ATs Ever," PC Magazine, February 16, 1988). At $1,529 including monochrome monitor and 20MB hard disk, it's a high-quality bargain. A 12-MHz model is also available. Looking back a little further, the AST Premium/286 has proven to be one of the most popular AT compatibles of all since it first came on the scene over a year ago. Many dealers offer deep discounts on the Premium/286. If you can find a good deal, give it strong consideration.

For PS/2 fans wondering how the IBM PS/2 Model 50 stacks up against all this competition: $3,595 buys you a 10-MHz 80286-based machine with 1MB RAM, one 1.44MB 3½-inch disk drive, an agonizingly slow 20MB hard disk, and no monitor.

Digital hard disk controller, a separate floppy disk controller, and a Key Tronic Enhanced-style keyboard. There are eight expansion slots available—two 8-bit and six 16-bit—and five half-height drive bays. The power supply is a 200-watt Astec with five device connectors.

A convenient turbo switch on the front of the unit is used to toggle the AT 286 between 8 and 10 MHz (with one wait state), and a reset switch performs a cold boot. The Star comes with the Award 286 Modular BIOS, Version 3.01, but you can specify a Phoenix BIOS if you want one. The Key Tronic keyboard has a snappy feel to it, very much like the IBM Enhanced-style keyboards.

The configuration tested had a monochrome monitor and a 30MB Seagate ST-238 hard disk with DOS 3.21 installed. The total price was $1,273. It performed the processor benchmark tests flawlessly.

In hard disk testing, the AT 286 turned in extremely disappointing results. The disk's 68-millisecond access time was unfathomably slow until the problem was spotted. The Everex hard disk controller in the system (the floppy disk controller is separate) had an 8-bit rather than a 16-bit interface, resulting in a tremendous data traffic jam that slowed the disk to a crawl.

EASY TO RUN The AT 286 is easy to set up and use and can be run right out of the box. If you change the configuration and have to run setup, you'll have no problem because the setup is built into the ROM BIOS (this feature is available only with Award BIOS, Version 3.01).

The documentation consists of one 60-page manual that covers assembly of the AT 286, the basic DOS commands, the different hardware components of the system, and problem troubleshooting. Overall, the manual is quite informative and provides a very thorough overview of the system in understandable layman's terms. New users will probably want to keep this manual around as a handy quick reference. DOS doesn't come with the AT 286, but you can order it separately for $79. Star does include the popular shareware word processing program, *PC Write*, with each AT 286 unit.

■ Star Industries packs many quality components into the AT 286 for an uncommonly low price.

Surprisingly, Star Industries packs many quality components into the AT 286 system for an uncommonly low price. The use of name-brand components like Western Digital, Astec, Key Tronic, and Intel (DRAM) probably accounts for the fact that the AT 286 has an extremely low failure rate. If you do need customer support for the Star AT 286, it's free. The warranty for the AT 286 lasts 1 year, and any faulty parts are replaced free of charge for the first 30 days. And if a Star AT 286 has to be returned, Star Industries pays for the shipping.

BANG FOR THE BUCK The Star Industries AT 286 is a quality machine with lots of bang for the buck. Although it isn't the fastest 10-MHz machine available, it's certainly one of the least expensive. But if Star Industries sacrifices performance to keep the price down, as seems to be the case with the 8-bit hard disk controller, it should change its strategy. The quality of the Star Industries AT 286 and its compatibility make it a very attractive choice for cost-conscious buyers, but in today's marketplace no one wants to (and no one needs to) settle for less-than-optimal performance.—**Greg Alwang**

How we made the most powerful integrated software a whole lot easier to use.

Yes. There are ways to take something that's very powerful and make it easier to use.

Actually, with Symphony® 2.0, not only is this latest version of the world's most popular integrated program easier to use, but it's also more powerful than ever. So it can keep up with you as your capabilities grow.

For starters, since there's no copy protection, you can get Symphony up and running with much quicker and easier installation.

Once up and running, bingo, you have instant access to five key business functions: spreadsheet, word processing, database, graphics and communications. So you can prepare budgets, write memos, create inventory lists without having to go through the hassle of changing programs.

But Symphony is really more than five separate programs. Because, unlike other integrated packages, Symphony lets you dynamically integrate functions. For example, when you change spreadsheet data, your graph of that data and your memo containing the same numbers automatically reflect the changes. So you get greater efficiency, and you're able to work faster too.

Plus, the Symphony spreadsheet is the fastest and most powerful spreadsheet available in integrated software, based on Lotus® 1-2-3®, the industry-standard spreadsheet technology.

We could go on about the many features of Symphony 2.0—how its macros let you automate complex or repetitive tasks and create customized applications. How the word processor now has a spelling checker and text outliner. And how database and communications have been improved.

The bottom line is that Symphony is one high performance package that's made to be opened up.

Lotus Symphony 2.0

© 1988 Lotus Development Corporation. Lotus, 1-2-3 and Symphony are registered trademarks of Lotus Development Corporation.

Hassle

free.

With a backup system from Irwin, you won't have to shuffle floppies all day just to protect your data.

Because our tape drives store up to 64 megabytes on a single minicartridge.

In a fraction of the time you'd spend making floppy backups.

Irwin's EzTape® software makes it hassle-free. Instead of complicated commands and procedures, it has Automatic Backup that you can set and forget. To store data automatically, every night, every weekend—whenever you want.

There's even On-Line Help for fast answers without burying yourself in a manual.

Our drives fit every popular personal computer and our space-saving internal drives fit right into your floppy disk slot.

An Irwin system works with all the popular networks, and just one of our tape drives can handle every computer on your LAN.

And our patented AccuTrak™ precision tracking technology allows you to transfer data from a PC to a PS/2 to a Mac.

That's a promise no other system makes, because no other system can.

Which may explain why more people buy our minicartridge systems than all others combined.

To learn more, call 1-800-BACKUP1 for your nearest Irwin dealer.

He'll demonstrate with convincing proof how easy it is to save your data.

And your peace of mind.

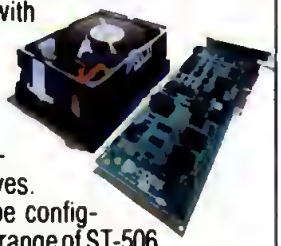
© Copyright 1988, Irwin Magnetic Systems, Inc. Irwin and EzTape are registered trademarks and AccuTrak and Irwin BACKUP are trademarks of Irwin Magnetic Systems, Inc. Other brand or product names are trademarks or registered trademarks of their respective holders.

CIRCLE 219 ON READER SERVICE CARD

ATomizer 286 and 386 Performance Solutions.

CORE's ATomizer 286/12 and 386/20-based PCs offer high-performance solutions to today's complex applications and operating environments.

High-Performance Internals. Both ATomizer 286/12 and 386/20 are equipped with a high-performance controller and up to two CORE internal drives. They can be configured with a range of ST-506 drives, from 30 to 144MB or ESDI drives, from 40 to 760MB. Combine access times as low as 10ms with CORE's disk caching system *(over 4,000KB/sec.)* for unsurpassed performance.



Backup. The ATomizer can be configured with powerful backup systems: CORE*fast* for diskette, winner of PC Magazine's Editor's Choice for two consecutive years, and COREtape, from 40 to 250MB.

Network File Servers. Novell Inc. has certified CORE's HC Series drives and controllers for use with NetWare version 2.1. Up to 3 gigabytes of storage may be configured. ATomizer 286 and 386 PCs also support other major LANs, including IBM Token Ring, 3Com and PC Net.

COREpower your LAN, CAD or desktop publishing system. Contact your nearest dealer or CORE representative today.

Northeast Region: 203/357-1339
Southern Region: 407/997-6055

Central Region: 312/439-0511
Western Region: 213/312-8130

International Sales: 407/997-6044, FAX: 407/997-6009

CORE® INTERNATIONAL

Come see us at PC EXPO, Booth #1547

Products listed and shown are registered trademarks of their respected manufacturers. CORE International. CORE *fast*, COREtape, HC Series and ATomizer are registered trademarks of CORE International Inc.

© Copyright 1988 CORE International Inc.

CIRCLE 225 ON READER SERVICE CARD

SCIENTIFIC WORD PROCESSORS: FORMULAS FOR SUCCESS

No longer needlessly complicated and cumbersome, today's scientific word processors simplify the task of integrating text and technical character sets.

Those who use scientific and technical word-processors are, to echo the old saw about the rich, just like you and me—except they ask a lot more of their WP programs.

The scientific-technical WP arena is, in a very real sense, just an extension of standard, full-featured word processing requirements. However, it's important to remember that there's sci-tech, and then there's *sci-tech*.

Many of the requirements of those who prepare less-technical scientific papers and manuscripts can be met very well by one of the powerful word-processing packages we looked at in our roundup of word processors in the February 29, 1988, issue.

Microsoft Word and *Nota Bene*, particularly, have become popular with academics—and not only those in the humanities and soft sciences. Both programs manage footnotes superbly, a hallmark of technical typescript. Both have nifty internal boilerplate features, so that if you tire of typing a long, complex, or simply uncommon word or term used frequently in the paper—say, *riboflavin*, *hymenopterous*, or *acetylsalicylic acid*—you can use a keyboard-macro shortcut to insert that word or phrase.

Both programs (and others reviewed in that issue) also handle long manuscripts very well—a relatively recent development in PC-based word processors.

Old hands at PCs—who've lost a chapter or two in their time to the vagaries of power failures, hard disk crashes, and those mysterious gremlins who creep into our offices at night to perform unspeakable and untraceable acts on our computers—may still prefer to

save longer works in single-chapter files. But the convenience of managing a several-hundred-word manuscript in one large file is undeniable—and, now, maybe even sensible.

BEYOND WORDS For many scientists, engineers, and others whose words pass through a PC en route to publication, complex equations are at the heart of their work. And getting those equations onto the screen, onto the disk, and eventually onto paper is a major stumbling block with most PC word-processing software.

With many programs you enter the IBM extended character set symbols by holding down the Alt key while typing the character's three-digit ASCII code on the PC's numeric keypad. But it's not just getting those delta and pi symbols into the work one by one that counts. It's combining them in multiline mathematical expressions, or as elements of chemical formulas, that's the trick. And this brings most PC word processors—and those who use them—to their knees.

The problem of getting complex numerical expressions into the computer, then getting something approaching typeset results out the other end of the system, was addressed in the 1970s by Professor Donald Knuth at Stanford University.

Knuth developed *TEX*—pronounced "tech" by knowledgeable users, "tecchhhh" (as in "blecchhhh") by the true cognoscenti—not as a sneer but to match the correct pronunciation of the Greek characters from which its name is drawn. *TEX* is essentially a formatter that accepts what look like ordinary (if confusing) ASCII files and drives output devices to produce good-looking and intelligible results on paper.

TEX has a set of keyboard entry conventions that at first seem merely illogical but soon become really infuriating; however, they can eventually be memorized and used to represent the ups and downs of superscripts, subscripts, functions, and so on—all to produce those complex mathematical expressions on paper.

DIFFICULTY IS PRESERVED To say that *TEX* takes a little effort to learn is like saying that with a little effort you could build your own full-scale, working Challenger spacecraft and run your own space shuttle program.

Over the past 10 years—during which Knuth's system was widely adopted in universities and research institutions—*TEX* has become, in effect, the Departmental Secretaries' Full-Employment Act. Thousands of secretaries and typists in physics, chemistry, engineering, and other technical departments across the world owe *TEX* thanks: their employers cannot let them go, cutbacks or not, because no one else in the department understands *TEX* well enough to get their papers out if their secretaries were to leave.

MicroTEX, developed by David Fuchs and published in 1985 by Addison-Wesley, brings the glory of *TEX* to the PC. A full implementation of the Knuth standard, *MicroTEX* lets users who know *TEX* make a rapid transition to a much less expensive, much more appropriately scaled computer and laser printer combination than that provided by the departmental minis and institution-wide mainframes often used for scientific or technical word processing. It also offers a rich set of challenges (chuckle) to the newcomer.

AUTHORS AND WPs The complexities of *TEX*, and the cult of those who have learned if not quite mastered it, illustrates one of the problems fundamental to most scientific and technical word-processing tools until very recently: they were often too complicated for the authors themselves to use.

It's not that a Ph.D. in astrophysics *couldn't* learn them so much as that he shouldn't *have to*. Mastering a word processing program is a reasonable and necessary qualification for writing in the scientific and technical domains today. But mastering a needlessly complicated program just to get words and figures down on paper is poor use of a technical person's time.

From running labs to teaching to speaking at colloquiums to writing grant proposals to selling research programs to administrating or managing to maybe even finding a few minutes to *think* about what he is trying to do . . . well, the life of a respected technical professional has few spare moments.

This means, too often, relying on others to get fragments of papers and other sci-tech documents into the computer, then tidying them up. Which makes for bad papers and worse science. Which has led to the appearance of good altematives.

THE LOTUS PRESCRIPTION *Lotus Manuscript*, for example, though in fact a good choice for many kinds of large, structured manuscripts, had been unabashedly positioned by Lotus as a sci-tech word processor suitable for an author's own use. Now Lotus will be marketing Version 2.0 of *Manuscript*, which we looked at in its beta release, as a general-purpose word processor.

Manuscript is a smart, capable, and civilized system, perfectly usable by the authors of sci-tech papers themselves (and not only by those who once "typed" their work) for text entry. It uses a set of equation-entry conventions similar to but more logical and easier to learn than those of *TEX*.

Better, it lets you start with a simple outline, expand that outline into a detailed, highly structured schema, and then gradually expand sections of that outline into a full-fledged manuscript. Because sections can be selectively collapsed to their headlines, you can keep "open" only the portion you are writing at the moment, while still seeing how that portion fits into the overall outline.

Manuscript also allows easy entry of tabular material and lets you draw rules, or lines, around and through those tables for more-attractive, more-readable results. And *Manuscript* can enfold graphs and charts from Lotus's own *1-2-3*, *Freelance Plus*, and *Graphwriter II* programs into its text, as well as compatible graphics files from other vendors' programs.

Manuscript is a good example of how much more PC-like scientific and technical word processing has become over the past 2 or 3 years.

Which is not to say that there aren't other good choices.

TWO ROUTES TO WP A longtime favorite, T^3 (known by its friends as "tee-cubed") has more little quirks than the U.S. Tax Code. It does its job very well, however, and in the process provides a very good on-screen display of the formu-

CONTRIBUTORS

Heeth Clark is general manager of Rhintek Inc., a systems software company that specializes in developing products and consulting in the areas of communications, compilers, editors, and graphics. She is also an instructor at Johns Hopkins University.

Henry Fersko-Weiss is a free-lance writer based in Warwick, New York. He is a regular contributor to several national publications.

Caroline Halliday is an electrical engineering consultant with High Tech Aid in Ellicott City, Maryland.

Alan Hoenig, who teaches mathematics at John Jay College in New York City, frequently writes about computer typesetting.

Patrick Nicholas, based in New York City, is a free-lance writer who frequently writes on computer-related topics.

Robin Raskin is a New York–based free-lance author, editor, and consultant specializing in computers. She writes frequently for *PC Magazine* and other computer publications.

Walt Rowinski is a free-lance technical writer based in Lakewood, Ohio.

Neil J. Rubenking is a contributing editor of *PC Magazine*.

Jim Seymour is a contributing editor of *PC Magazine*.

Richard Hale Shaw is a software engineer at Hilgraeve Inc., a Monroe, Michigan–based communications software vendor.

Kenneth H. Werner is the founder and owner of a Houston, Texas, information consultancy specializing in human factors and audits.

las you're entering. It's especially good for chemists who must reproduce chemical formulas on paper.

Comparing *Manuscript* and T^3 is illuminating because they represent two very different but very interesting approaches to meeting the needs of the scientific-technical word processing user.

Manuscript appears to be strictly character-oriented in text entry mode. Using color, you'll get a few clues indicating boldface or italic type, but the program is designed for rapid text entry and editing. Indeed, its text-handling speed approaches that of *XyWrite* and Version 4.0 of *Microsoft Word*, two of the fastest programs examined in our previous look at general-purpose word processing programs.

But if you try to see how your finished pages will look by slipping into *Manuscript*'s page-preview mode, you're in for a surprise: you'll discover that the program isn't character-oriented after all. On a graphics monitor you can slog through an incredibly slow page-by-page visual inspection of how the finished pages will look. Text is "greeked" (or simulated, with illegible squiggles), but if you wish you can blow up sections of the text to confirm (in simple stroke-font letters and numbers) that complex formulas have been entered properly.

T^3, by contrast, stays in graphics mode throughout the writing and editing process. Boldface, italic, underlining and strikethrough (and combinations of the above), as well as complicated multiline formulas, are shown on-screen as you work.

You pay a price, however, for that display: T^3 is much slower than *Manuscript* or the faster general-purpose word processing programs are at text entry and editing maneuvers.

NO MORE INDIA INK A very large percentage of scientific and technical papers, proposals, and manuscripts are still written by hand or typed very roughly on a typewriter or PC, then finally retyped by secretaries who leave blank spaces for symbols and complicated equations. Later, these symbols and equations are carefully inked in with a pen. Duplicate copies are made on a photocopier.

That's a shame—especially when the text of those papers originates on a PC running word processing software. Today, PC word processors are available that make text entry and editing fast and easy, allow authors to compose technical matter and formulas directly from the keyboard, and can insert graphs, illustrations, and even screened photos of lab apparatus or of the projects and phenomena described in the text.

As we see these dramatically improved PC-based word processing tools moving onto the PCs of scientists, engineers, and other technical personnel, with perhaps only a final cleanup and printout reserved for secretaries (who may, for example, have access to a fast laser printer), we're likely to see far fewer inked-in papers delivered at conferences and submitted to journals.

Those papers—and their mistakes, illegible numbers, and odd-looking symbols—won't be missed.—**Jim Seymour**

Alexander

Word processors gain popularity by coupling power with ease of use. Similarly, programs that offer power but are not easy to use often fall by the wayside. *Alexander*, from Design Enterprises of San Francisco, is a $245 personal word processor that has many useful features for scientists, mathematicians, composers, and anyone wanting to display foreign-language characters, but the way the features are implemented makes the program very difficult to use.

Written in compiled BASIC, *Alexander* will conquer you before you conquer

PC MAGAZINE FACT FILE

Alexander, Version B
Design Enterprises of San Francisco
P.O. Box 14695
San Francisco, CA 94114
(415) 282-8813
List Price: $245

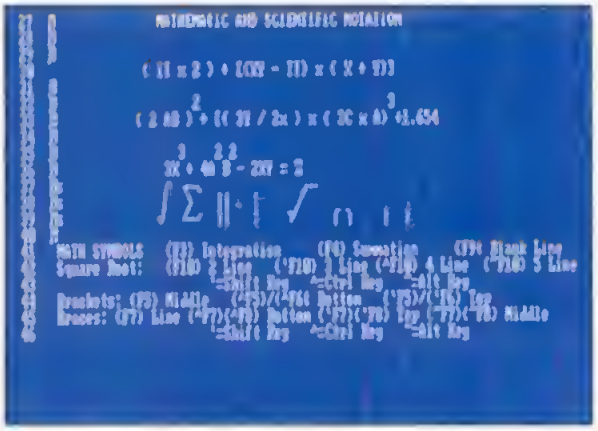
Requires: 256K RAM, one disk drive, DOS 2.0 or later.

In Short: A difficult, poorly implemented word processor that requires a keydisk. You can display mathematical equations and chemical symbols as well as music charts, but you wouldn't want to. Not copy protected.

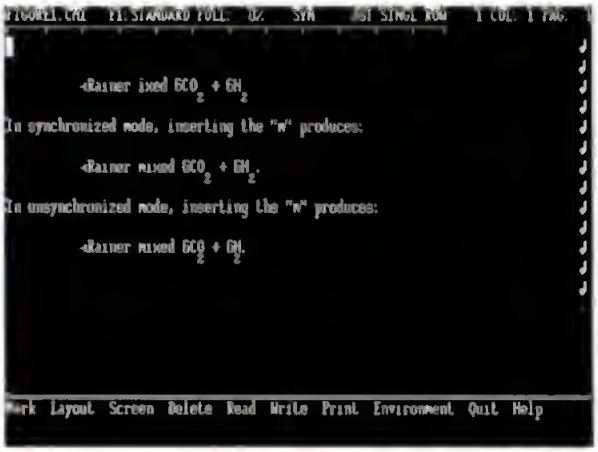
CIRCLE 643 ON READER SERVICE CARD

SEEKING THE RIGHT FORMULA

Broad character selection and flexible layout options are top priorities when choosing a scientific word processor. Here's how several programs present these features.

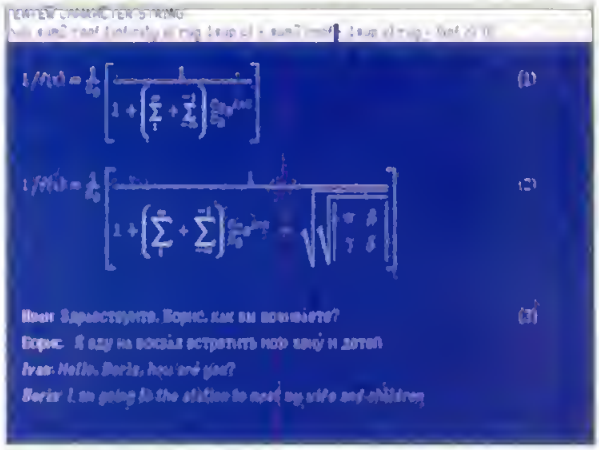


Alexander *lets you assemble mathematical or scientific equations on-screen. To create any additional symbols you require, you can use* Alexander's *character-generation program, which also allows you to remap the keyboard or mask unused letter keys.*

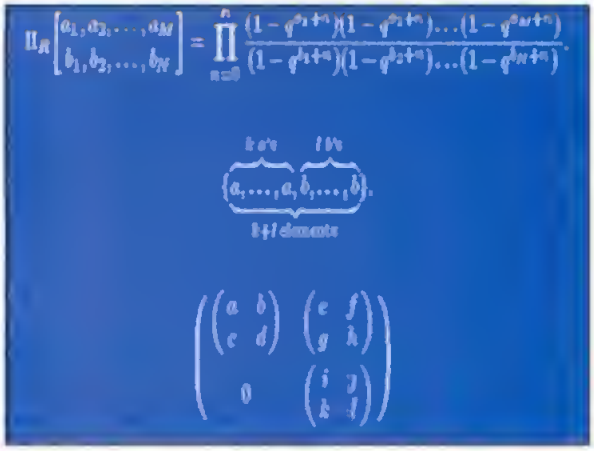


For editing text that includes formulas, **ChiWriter**'s *synchronized mode ensures that subscripted characters shift their position along with the rest of a formula. Here the letter* m *is added to the text, with the results shown in both modes.*

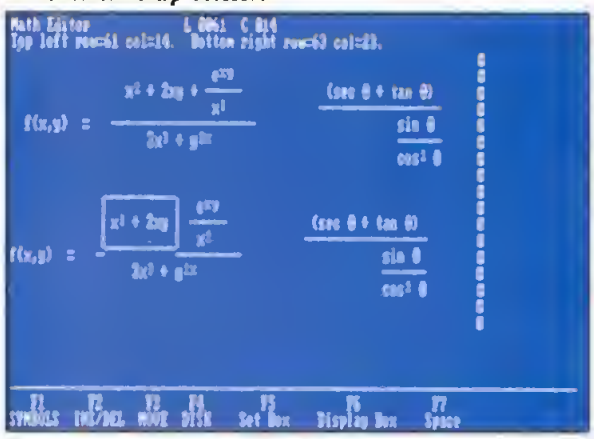
The Egg *keeps each equation on one line wherever possible and allows up to 17 levels in a single equation. The program's fonts contain an extensive variety of technical symbols; any other symbols may be created using a utility that comes with the software.*



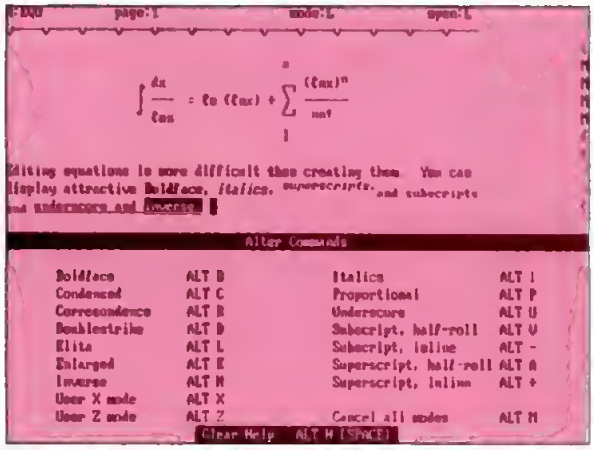
The **EXP** *display, completely WYSIWYG, shows on its status line the mnemonics that produced the bracketed expression in the denominator of equation 1. To produce equation 2, more elements were added to equation 1.*



More a language and compiler than a text editor, **PCTeX** *accepts its commands for special symbols in a document prepared jointly with another word processor.*

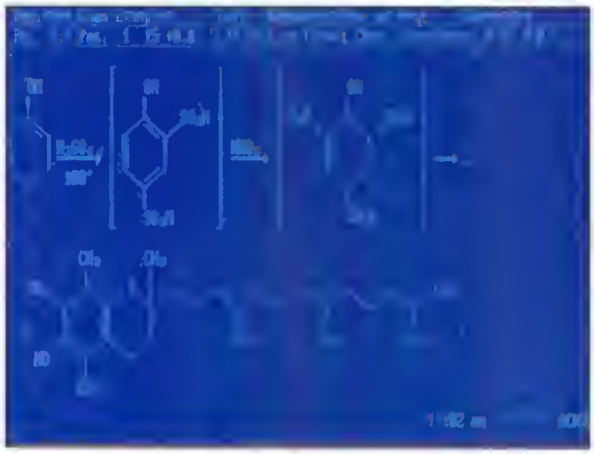


Math characters, like many other special symbols, are input using function keys in **Spellbinder Scientific.** *The program's math edit macro simplifies the entry and editing of a mathematical diagram.*

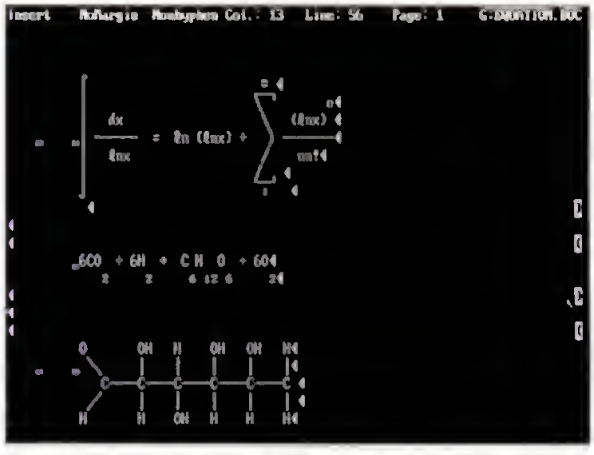


In addition to creating attractive equations in WYSIWYG fashion, **Tech/Word** *is WYSIWYG oriented in its text composition, displaying bold, italics, sub- and superscripts, underscore, and reverse video. Footers and headers are not WYSIWYG.*

Both text and equations in **PS** *are initially entered in the text mode, where the linear format for equations makes them easy to enter and read.*



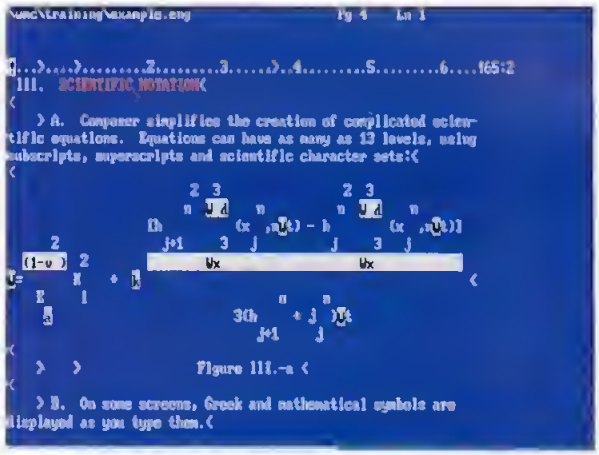
In this complex chemical diagram created in **T³**, *the message in the top-left corner notes that a file called "Chem Examples" is being revised.* **T³** *allows filenames that DOS would not accept.*



In **TechWriter***'s equation and chemistry mode, mathematical equations and chemical formulas can both be entered. Each line on the screen represents a half line on the printer. Subscripts can also be printed a half-space wide to improve the look of the output.*

("Seeking the Right Formula" continued)

Once you open a file in **Total Word,** *you can access more than 400 scientific characters by calling up one of nine special on-screen keyboards. Often-used equations or the process of drawing compounds can be automated with macros.*



WordMarc Composer *has three technical character sets available: Greek, chemical, and DecTech. In addition, the conventional English alphabet can be modified with a few keystrokes to reflect European punctuation.*

it. The installation process makes you think that you can install it to and run it from a hard disk, but you quickly discover that no matter where you run it from, it requires a keydisk in drive A:. The first thing *Alexander* dislodges is your CONFIG .SYS file and, if you're not careful, your AUTOEXEC.BAT file, too.

Alexander works with a monochrome, CGA, or HerculesPlus video board. Although the screen resolution on a monochrome monitor is adequate for text display, you'll need a CGA monitor in order to see any of the extended ASCII characters. But although *Alexander* requires a CGA, it can't work in color—all you get is high-intensity white—and unfortunately, it won't recognize an EGA or VGA card.

Alexander is menu driven and has light-pen and mouse drivers to make choosing selections easier. The menus get to be intrusive because you have to use them to get anywhere.

FOUR MODULES *Alexander* has four modules: basic word processing, editing, printing, and a control program. The basic word-processing module is for creating documents containing up to 18 pages of double-spaced type. The editing program, which handles larger documents, has a file-chaining selection that lets you link files together, giving you the illusion of one document.

You can print most small documents (no longer than 18 pages) directly from the word processing and editing menus, but for larger jobs you have to go to the printing program. The control program takes care of the default values and the printer controls.

In addition, a character-generation program lets you create your own display characters, remap the keyboard, or mask unused letter keys. *Alexander* even has a typesetting module.

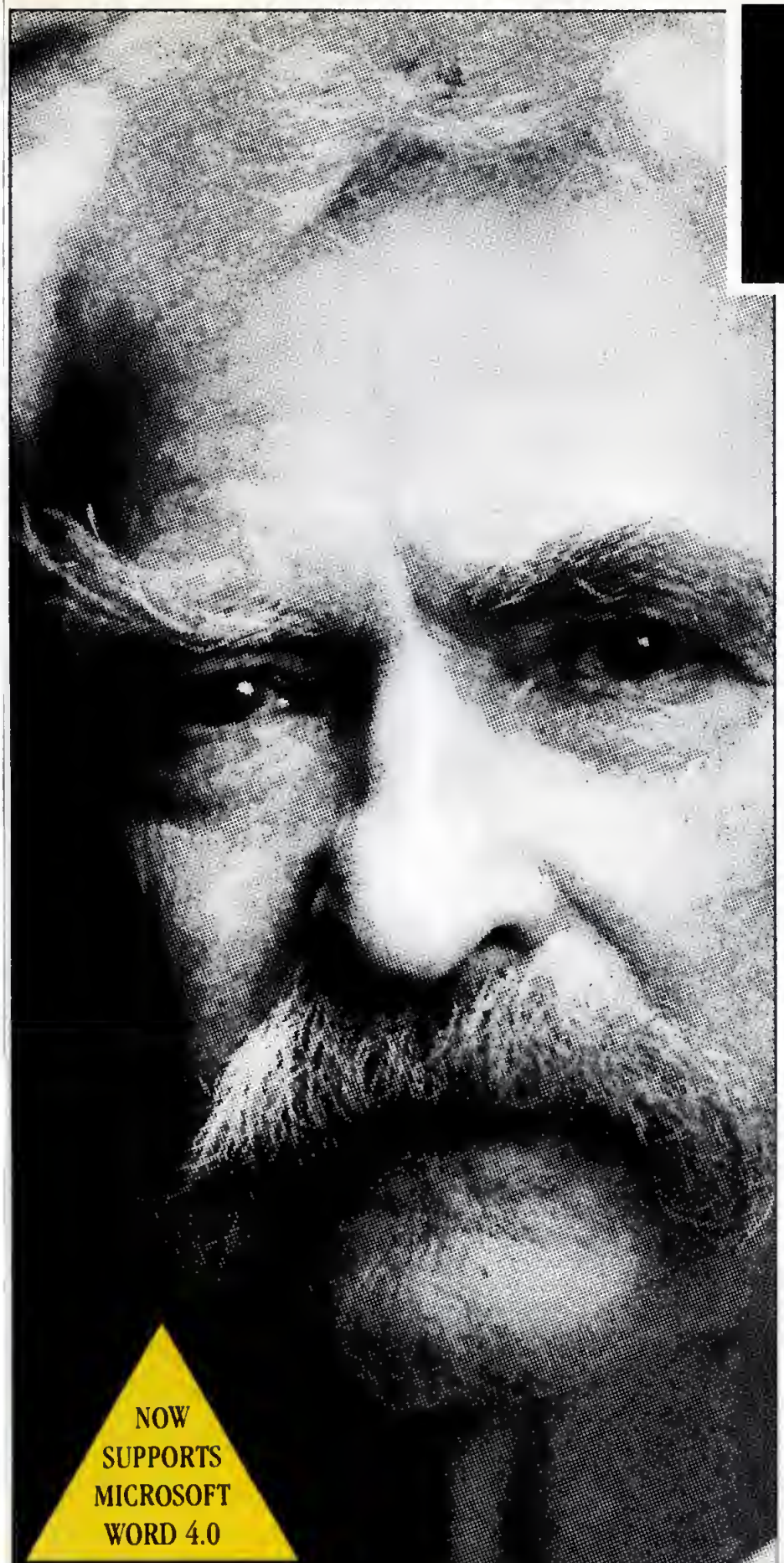
When you start the basic word processor, *Alexander* uses the standard defaults set out by the control program: line length is 65 characters, and tabs are set at every five stops. Line length can vary from 5 to 255 characters. *Alexander* saves to files and reads them in a text format that includes any special formatting codes. It can also read and write ASCII files directly.

Text formatting is shown on-screen with embedded characters identifying bold, underline, and super- and subscripts, among others. During editing you can do block moves, copy, delete, and search and replace. When you are in text-editing mode, *Alexander* changes the cursor from an unblinking underline character to a disconcerting, fluttering rectangle.

ALTERNATE CHARACTER SETS Word processing in another language is possible with *Alexander*, but not easy. You can remap the keyboard, no small task in itself, and write a glossary help screen to show you which keys have been changed; this screen replaces *Alexander*'s regular help display. None of these are simple operations. In order to use any special characters you first have to load the word processor, then load the special characters, return through the menus to load the glossary phrases, and, finally, you can begin typing.

Graphics character sets are available for music composition, mathematical and scientific equations, molecular charts, and electronic schematics. Cyrillic, Hebrew, Greek, and accents for most European languages are available, too. You can buy key decals in Cyrillic, Hebrew, and Greek, and if you type in Hebrew, it is possible to enter characters from right to left.

Multiline equations are done by first entering "graph paper" on the screen and then doing a character-by-character entry to build models that use more than one line. Music composition is entered in mu-



NOW SUPPORTS MICROSOFT WORD 4.0

Photo of Mark Twain by The Bettmann Archive.

This ad is typeset with Bitstream fonts.

Fontware for word processing. It won't make you a great writer. But you'll have a face like one.

Bitstream Fontware now works with WordPerfect 5.0 and Lotus Manuscript 2.0. So no matter what kind of writing you do, you can print it with the kind of typefaces people remember.

They're the same revolutionary typefonts now changing the face of MS-DOS desktop publishing. Which means you'll be changing the faces on your letters, reports and proposals with the finest professional typefaces anywhere. Dozens of faces that look better and read easier. That convey your thoughts and your image more clearly. And that reproduce perfectly, in nearly any size, on virtually any Hewlett Packard, compatible or PostScript PDL laser printer.

See your dealer today. Or call us at 1-800-522-3668 (617-497-7512 in Massachusetts). Get the simple facts about choosing and using Fontware to print everything you write. Because if you want them to remember your words, it helps to have a face they can't forget.

Bitstream®

FONTWARE™

CIRCLE 218 ON READER SERVICE CARD

© 1988 Bitstream Inc., BITSTREAM is a registered trademark and FONTWARE is a trademark of Bitstream Inc. The following are registered trademarks of their owners: WordPerfect – WordPerfect Corp.; Lotus Manuscript – Lotus Development Corp.; PostScript – Adobe Systems Inc., Hewlett Packard – Hewlett Packard Co. © 1988 The Mark Twain Foundation Trust under license authorized by Curtis Management Group, Indianapolis, Indiana.

FRIENDLINESS.
"For corporate use, Release 3 is hard to beat. Its friendly user interface can have even temporary workers up and running within minutes..." *PC WEEK*

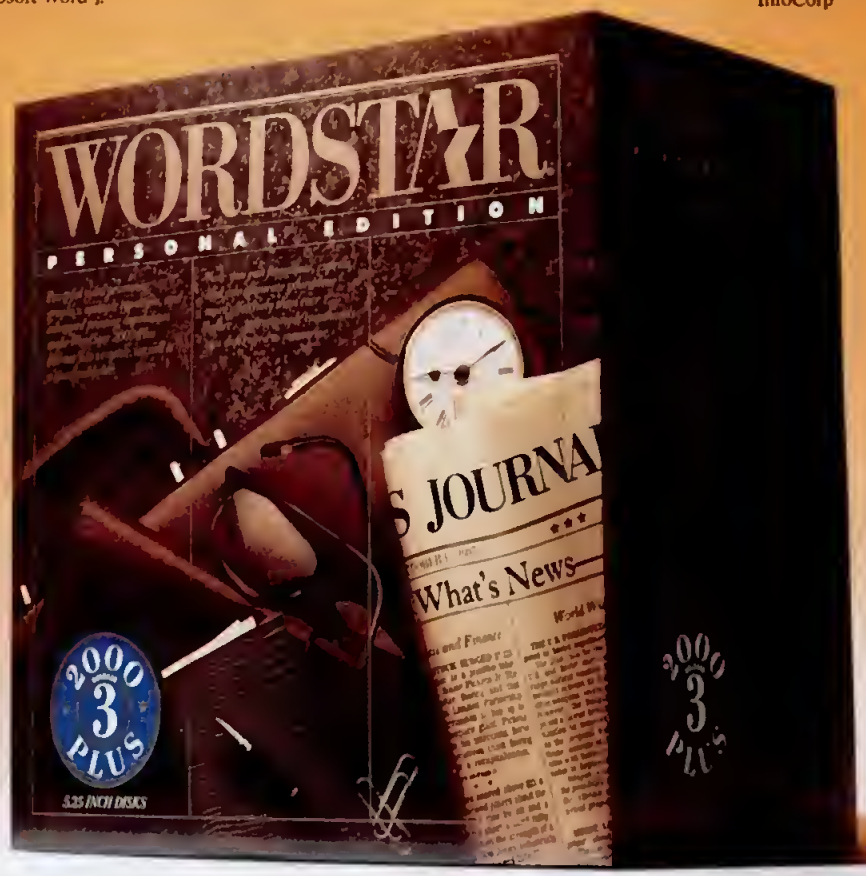
"Easier to use than either [WordPerfect® or Microsoft Word®]." *Personal Publishing*

PUBLISHING.
"Comes with all the additional software necessary to effectively publish (both desktop and presentations) with a word processing program." *Personal Publishing*

"...All of the publishing capabilities most firms are likely to need." *PC WEEK*

FEATURES.
"Allows you to convert files to or from DisplayWrite®, Microsoft Word, MultiMate Advantage II®, WordPerfect 4.2, WordStar® Professional, ASCII, and IBM® DCA FFT formats." *InfoWorld*

"...A clear winner in overall applicability...Ideal for corporate users..." InfoCorp



SUPPORT.
"The best telephone support policy in the business." *InfoWorld*

PRINTING.
"...The best LaserJet® output from any IBM word processing program." *Personal Publishing*

"Printer support is among the most extensive of any word processing package." InfoCorp

PRICE.
"A slew of useful add-on programs for free..." *Personal Publishing*

SPEED.
"Faster word processor now ranks among the best..." *InfoWorld*

HOT WORDS

Some of the brightest reviewers in the software business are giving their highest ratings ever to WordStar® 2000.

In January *InfoWorld* awarded WordStar 2000 a 9.1, its highest rating for a word processor, and added that WordStar 2000 gives users "...an awesome features list, significantly improved performance, excellent documentation, and superior support."

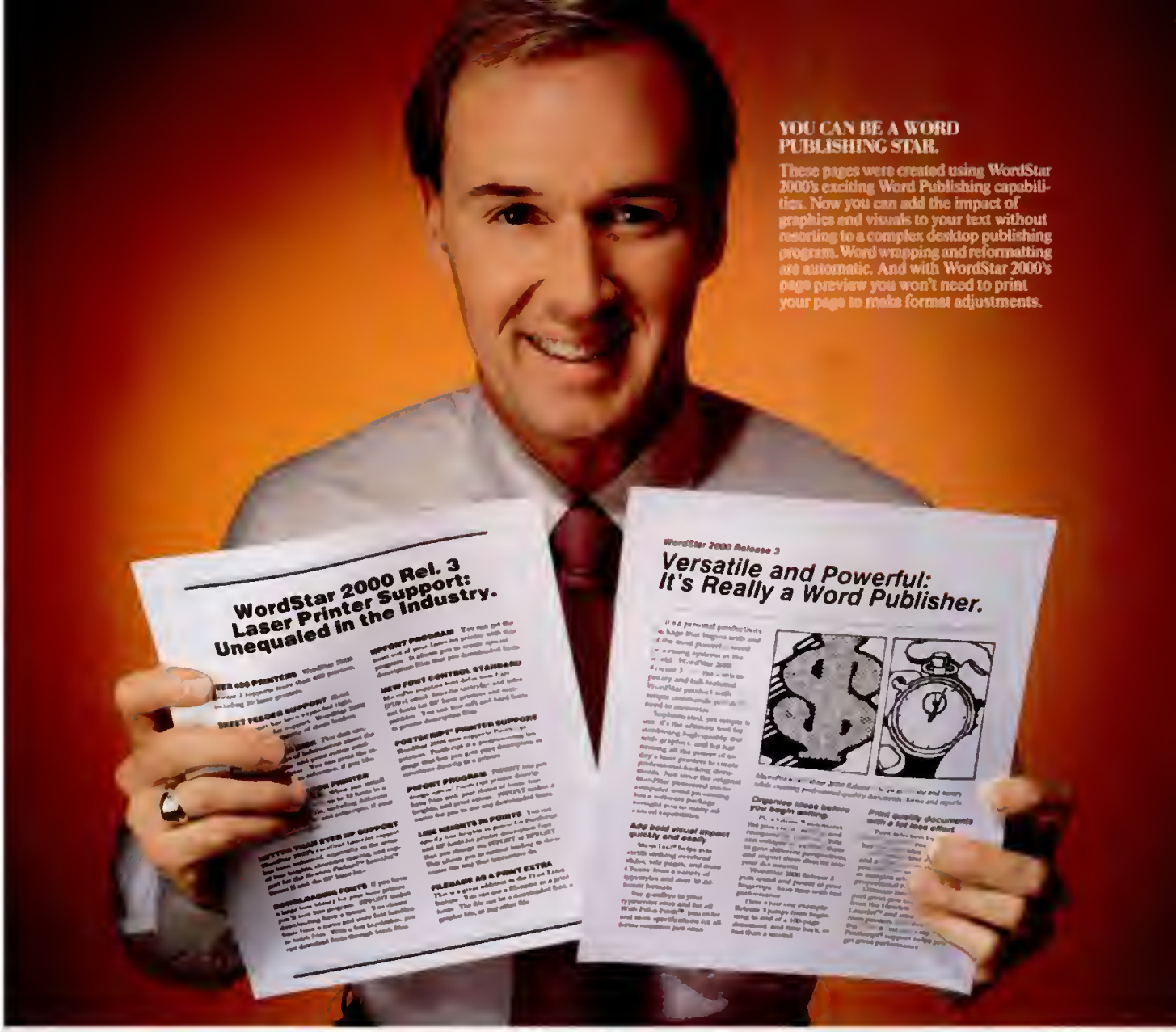
InfoCorp says that WordStar 2000 offers "...a distinct speed advantage..." And *PC WEEK* summed it all up by saying "MicroPro is offering a real bargain here..."

If you're ready to switch on the power of Word Publishing,™ you need to learn about WordStar 2000.

OFFICE/PROFESSIONAL WORD-PROCESSING-SOFTWARE

	WordStar 2000 Plus	Microsoft Word 4	Word Perfect	Multimate Advantage II
Ease of Use	Very Good	Very Good	Very Good	Very Good
Technical Support	Excellent	Satisfactory	Good	Satisfactory
Support Policies	Excellent	Good	Good	Satisfactory
Value	Excellent	Excellent	Excellent	Satisfactory
Documentation	Excellent	Excellent	Excellent	Very Good
Speed	Good	Good	Good	Poor
Compatibility	Excellent	Satisfactory	Very Good	Excellent
Totals of all Categories	**7.8**	**7.4**	**7.3**	**5.4**

March 28, 1988 *InfoWorld* ranked WordStar 2000 as the top product.



STAR RESULTS

If you're looking for a powerful word processor that can help you make powerful communications, you've found it: WordStar 2000. It's a feature-rich word processor with the added ability to incorporate graphics right into your text. WordStar 2000 lets you add pictures to your words to create documents with the graphic impact of desktop publishing.

It's easy to learn and use WordStar 2000. And when you have questions, MicroPro® offers the best support in the business. Our toll-free lines operate seven days a week.

We'd like to send you the word on WordStar 2000 and why it's right for you. For details and copies of the rave reviews, call 1-800-227-5609 (Ext. 465).

WORDSTAR® 2000

WORD PUBLISHING POWER

A LAN version and a Legal Edition of WordStar 2000 are available.

Word Publishing is a trademark and WordStar and MicroPro are registered trademarks of MicroPro International Corporation.

*Trademarks of third parties.

MicroPro.

CIRCLE 240 ON READER SERVICE CARD

sic charts that *Alexander* conveniently paints to the screen. When you're in edit mode, you enter the notes, sharps, flats, and so on.

Alexander lets you do just about anything you want, but not easily. The package's shortcomings include its use of a keydisk and its repetitive, intrusive menus. There is at least one similarity between *Alexander* the word processor and Alexander the Great: it would not be worthwhile to tangle with either of them.

—Patrick Nicholas

ChiWriter

ChiWriter, from Horstmann Software Design Corp., is a scientific word processor that makes the processes of including mathematical symbols and line drawings within text and generating different fonts a snap. Editing formulas and equations is equally simple.

ChiWriter costs $79.95 for a base configuration that includes fonts for mathematical symbols, CGA compatibility, and printer drivers for 9-pin dot matrix printers. You'll have to spend an additional $24.95 for video drivers if you want Hercules, EGA, and VGA compatibility. Drivers for Hewlett-Packard LaserJet and PostScript printers cost $59.95, and those for other dot matrix printers cost $24.95. Fonts for chemistry symbols cost an additional $49.95.

ChiWriter can be installed on a single-floppy-disk-drive system with 256K RAM. A dual-floppy or hard disk system and 512K RAM are recommended for large word-processing jobs, however. The program does not come with a spelling checker or thesaurus. Horstmann Software reports that Version 3.0 of *ChiWriter* will sport a spelling checker and will also support PostScript printers.

SELECTING FONTS The program's function keys hold the secret to selecting fonts. Up to 20 fonts (italic, bold, math, line-drawing, Greek, Standard English, and others) are assigned to keys F1 through F10 and Shift-F1 through Shift-F10. Switching from one font to another is just a matter of selecting the appropriate function key to use.

The default font is Standard English, located at F1. To change from Standard English to the "small" font (an alphanumeric font suitable for sub- and superscripts), for example, you merely press F2 at the appropriate spot in your text. Press F2 once, and only the next character will be "small"; all characters thereafter will be printed in Standard English. Press F2 twice, and the "small" font remains active. And if you press a font-change key followed by Alt-H, *ChiWriter* will display a keyboard chart that tells you which key encodes which symbol.

When you activate a function key, the symbols appear on the screen in the selected font. With the exception of proportional spacing, *ChiWriter* offers WYSIWYG word processing.

The *ChiWriter* screen has four information lines. Across the top of the screen are the tab-ruler and mode line (which identify tab locations, the selected font, and the insert, spacing, and synchronization modes). Across the bottom of the screen are two rows of information: one a command line, the other a brief description of the selected command. You can hide this bottom portion if you wish to display more lines of text on-screen.

You issue editing commands either through the menu at the screen bottom or through Ctrl-key or Alt-key combinations. Marking text, moving text, wrapping words, selecting tabs, and searching both forward and backward are only a few of the commands that you can select using this method.

GENERATING SYMBOLS With *ChiWriter*, generating math and scientific symbols is a breeze. There are two math fonts and four scientific fonts that will give you just about any symbol you'll need. You can create special symbols by mixing the symbols or line-drawing fonts with the math fonts. Moreover, *ChiWriter's* Font Designer gives you added control over special symbols and characters, allowing you to edit two fonts at the same time or create a new symbol by cutting and pasting, painting, changing the width of the characters, or overlaying the character boxes of two edited fonts.

ChiWriter also makes it easy to write and edit formulas and equations. To obtain a sub- or superscript, you must employ a two-key command; *ChiWriter* moves the next character up or down one-half line space into the sub- or superscript row. Since symbols are shown correctly on the screen, errors are easy to spot.

ChiWriter shines in its edit mode, because it lets you control the spacing after inserting or deleting text. When inserting a character into an equation that includes sub- or superscripts, for example, you first press the synchronization toggle key (* on the numeric keypad) to switch into synchronization mode. In this mode, the sub- or superscript character moves aside—in its proper place beside the character preceding it—to accommodate the insertion. Otherwise the sub- or superscript would end up, respectively, beneath or above the character it was meant to follow.

On the downside, *ChiWriter* will not calculate the formulas that you enter. Lines cannot be longer than 80 characters. Footnotes, headers, footers, and endnotes are available, but footnotes cannot run across two pages.

All in all, *ChiWriter* is easy to use and provides WYSIWYG multisymbol capability that you won't find in many more-expensive word processors. The program is an excellent secondary word processor for users whose documents require specialized symbols and line drawings.

—Heeth Clark

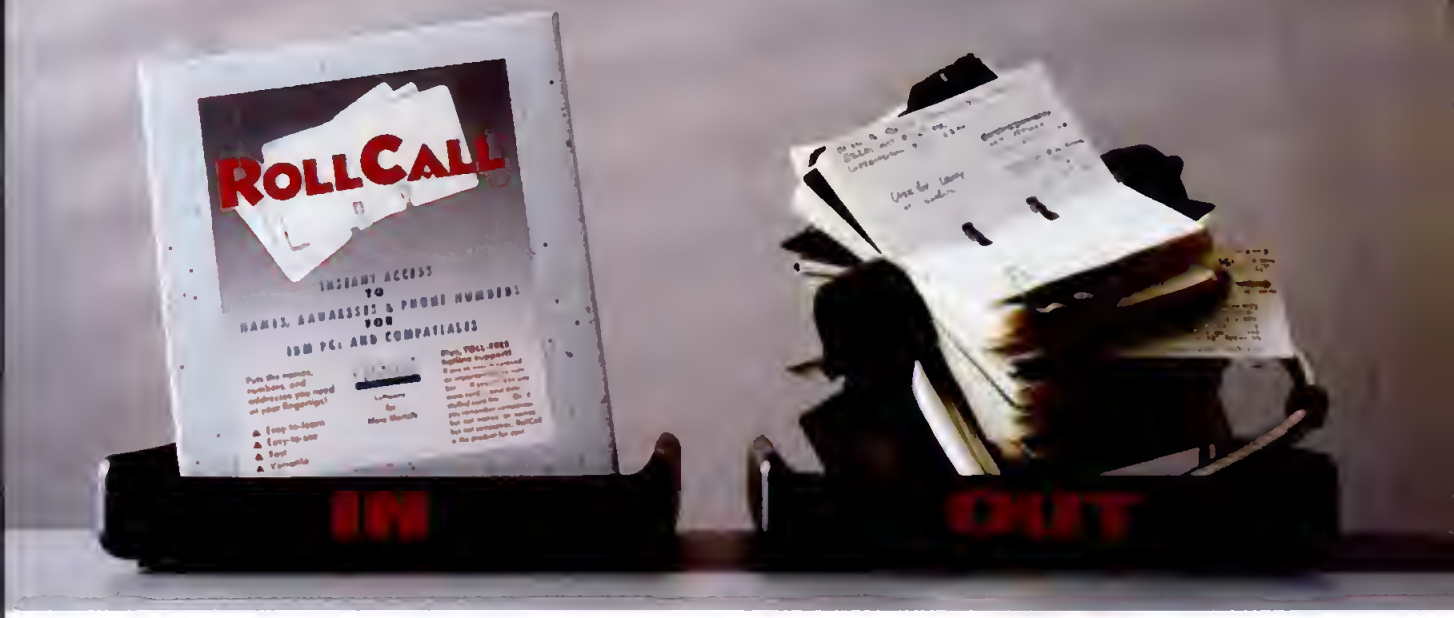
PC MAGAZINE FACT FILE

***ChiWriter*, Version 2.5**
Horstmann Software Design Corp.
140 E. San Carlos, #200
P.O. Box 5039
San Jose, CA 95150
(408) 298-0828
List Price: $79.95; video drivers for Hercules, EGA, VGA, $24.95; drivers for HP LaserJet and PostScript printers, $59.95; drivers for printers other than 9-pin, $24.95.
Requires: 256K RAM, one disk drive, DOS 2.0 or later.
In Short: An easy-to-use WYSIWYG package with powerful scientific/multifont word processing at a bargain price. Not copy protected.

CIRCLE 642 ON READER SERVICE CARD

ANNOUNCING ROLLCALL

the "instant access" address system that puts your old card file in its place.



Does this situation sound familiar? You need to call a temporary service right away. So, you turn to your address file and flip through the Ts for "temporary." Not there. How about the Ss for "services" . . . the Ws for Will B. Quick Temporary Service . . . the Qs? Maybe somebody "borrowed" the card.

Now RollCall™ gives you instant access to the names, addresses, and phone numbers you need. When you put this system on your IBM® PC (or compatible), you'll have the important people in your life at your fingertips much faster than you can say Will B. Quick.

Look at these RollCall features:

EASY-TO-LEARN: Learning RollCall is a breeze. Look at the instructions once . . . and you're an expert.

EASY-TO-USE: RollCall resides in your computer's memory, and you can pop it up instantly—even when you're running another program. RollCall eliminates the chore of writing and maintaining information on paper. And, you can "jot down" any comments you want to remember about each person, so you still get the flexibility of a manual file.

FAST: Three seconds or less. That's all it takes to get the name, address, and telephone number you need.

VERSATILE: Whether you need to keep track of 50 names or 50,000, RollCall allows you to locate them by name, affiliation, and even your own designation. You can use it while you're writing a letter with your word processing program—RollCall will automatically insert the person's name and address right into the letter. Or use it to print envelopes and mailing labels. You can even print a directory to take with you on the road.

A GREAT BUY: RollCall costs only $49.95. Amazing when you consider that we include a 3-1/2" diskette in addition to a 5-1/4" diskette, so you can conveniently put RollCall on any system. And we offer you TOLL-FREE hotline support *absolutely free of charge.*

ROLLCALL Is for YOU! Perfect for office or personal use . . . for large corporations or small businesses . . . for salespeople . . . for executives . . . for secretaries . . . for clubs and associations. RollCall is for anyone and everyone who needs to organize and use a list of names and numbers!

THE ROLLCALL GUARANTEE: Don't wonder whether or not RollCall will make your life easier. Try it! If you're not satisfied, then we'll take it back within 30 days and refund your money. To order now, call TOLL-FREE today:

1-800-888-DOIT.

(That's 1-800-888-3648. In the Washington, D.C. Metro Area, call 264-8900.)

Need RollCall immediately? Ask about next day and 2nd day delivery.

CIRCLE 384 ON READER SERVICE CARD

ROLLCALL™
Order Form

☐ Send me ____ copy(ies) of RollCall at $49.95 plus $2.50 shipping and handling per copy. Virginia orders add 4.5% sales tax ($2.25) per copy.

Name_____

Address_____

_____

City_____ State_____ Zip_____

Phone # (in case we have a question about your order):_____

CHECK ONE:

☐ Check enclosed (payable to Qandu Computing).

☐ Charge my:

☐ VISA ☐ MasterCard

Acct. #_____

Expiration Date_____

Signature_____

PCM7/88

Mail to: Qandu Computing, Inc.
12040 South Lakes Drive
Reston, VA 22091.

QANDU COMPUTING

Software for Mere Mortals

© 1988 Qandu Computing Inc. RollCall and Qandu Computing are trademarks of Qandu Computing, Inc. IBM is a registered trademark of International Business Machines, Inc.

With IRMAremote, you can talk to your mainfram

Whether you're on the road in Why, Arizona or opening a remote branch office in Chicago, Illinois, you and your personal computer can be as close to mainframe information as the nearest telephone.

Introducing IRMAremote™ from DCA.®

IRMAremote offers reliable, inexpensive and accurate access to your mainframe no matter where you are. That means downloading files, electronic mail, data extraction and data entry—everything, in fact, that IRMA™ offers. And that includes supporting all of the mainframe file transfer software from DCA and IBM® your company has invested so much in.

What's more, it doesn't matter what kind of protocol your network runs on. Right now, there are

DCA is a registered trademark and IRMA and IRMAremote are trademarks of Digital Communications Associates, Inc. IBM is a registered trademark of Internationa

t from places once considered out of the question.

IRMAremote products for both SNA and BSC. Soon, there'll be a third for X.25. And if you use modems with the Hayes® AutoSync feature, all you have to buy is our IRMAremote software.

Perhaps most importantly, IRMAremote is made by DCA, the company that has set the standard in reliable micro-to-mainframe communications. A fact that your Data Communications Manager will really appreciate when you request an IRMAremote for yourself or your office.

Not only will a phone access your mainframe, it will also access all the information you need on our IRMAremote products. Dial toll-free, 1-800-241-IRMA, extension 518.

dca

ss Machines Corporation. Hayes is a registered trademark of Hayes Microcomputer Products, Inc. © 1988 Digital Communications Associates, Inc. All rights reserved.

CIRCLE 531 ON READER SERVICE CARD

Today's managers are expected to learn word processing in their spare time.

NEW VERSION 2.0

Fortunately, that's all it takes.

Can Professional Write significantly reduce the time and cost of your training and support? Call 1-408-848-4391, Operator #60 for a free trial disk.

Truth is, the best business people have the least spare time. So Professional Write 2.0 was designed to get them up and running immediately.

Professional Write 2.0 has all the features managers demand, and saves them the frustration of learning programs designed for full-time typists.

Our learning process speeds up the word process.

Anyone can learn Professional Write in a couple of hours. The screen is as familiar as a piece of paper. Pull down menus and an online manual means there's nothing to memorize. Our follow-along tutorial is written in plain English, and our context-sensitive help is one of the best available.

It all ensures that your managers spend their time managing, instead of asking for help.

We're the most compatible with your secretaries.

We gave Professional Write the most extensive and direct connections with the other software standards in your office. No other program does it so easily. Professional Write has built-in compatibility with MultiMate,™ WordPerfect,™ Microsoft Word,™ WordStar,™ Wang™ PC, DCA, and ASCII. You can directly import Lotus 1-2-3™ worksheets without retyping; include a chart from Harvard Graphics when printing; and mail merge quickly with dBase III™ files.

We give your printers the perfect set-up.

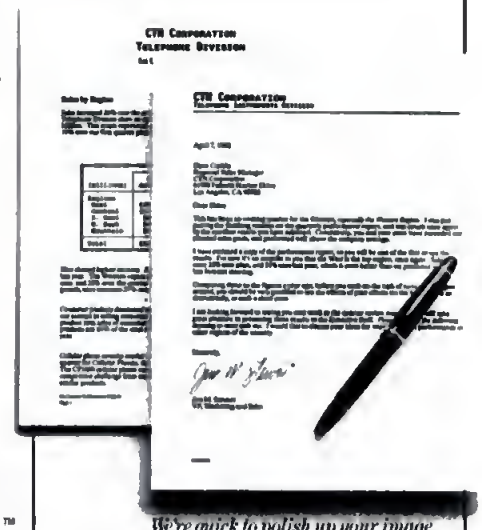
Now using multiple fonts with an HP Laser Jet,™ Apple LaserWriter,™ PostScript™ or HP DeskJet™ is as simple as underlining. And printer support has never been easier, because Professional Write is preconfigured for quick installation.

We have a fast new way to find your documents.

You no longer have to spend your valuable time hunting down files. Our new *File-Finder* searches through the actual text of *all* your Professional Write files to find any words or phrase, and will call up the appropriate document. We'll also give you sorted lists of files, and the option to identify your files with summary descriptions.

There's more to our feature story.

We know what managers need from a word processor. That's why Professional Write offers speed keys, macros, and column-move. An integrated spelling checker,



We're quick to polish up your image.

thesaurus, on-screen calculator and address book are only a keystroke away. We also support all the popular networks.

Put time on your side. Call 1-408-848-4391, Operator #60 for a free trial disk.

PFS: Professional Write and PFS: Write owners Call 1-800-255-5550 for upgrade information.

SPC SOFTWARE PUBLISHING CORPORATION

The designers of PFS.

©1988 Software Publishing Corporation, 1901 Landings Dr., Mountain View, CA 94039-7210

Scientific and Technical Word Processors: Summary of Features

(Products listed in ascending price order)

Product name	Tech/Word	ChiWriter	EXP	Alexander	WordMerc Composer	PS
List price	$75.00	$79.95	$150.00	$245.00	$375.00	$395.00
Price of upgrade	Free	$10.00	$25.00	Free	$149.00	$40.00
Network version						
Cost of mnstnr program	N/A	N/A	N/A	N/A	$695	N/A
Nn. of esers licenen ellows	N/A	N/A	N/A	N/A	1	N/A
Cost per nddltionel eser	N/A	N/A	N/A	N/A	$150	N/A
Site licenee avelnble	○	○	○	○	●	●
Memory usage						
Expandnd mnmnry	○	○	○	○	○	○
Extended memory	○	○	○	○	○	○
Disk usage						
Disk npncn reqnired	350K	150K	110K	440K	1,500K	403K
Program le entirely memory renidnnt	○	●	●	○	○	○
Text formatting features						
Left jostification	●	●	●	●	●	●
Center jnetification	○	○	●	○	○	●
Right justificntion	○	○	●	○	●	●
Proportinnal npncing	○	●	●	○	●	●
Adjnstable tnft nnd rigbt mnrginn	●	●	●	●	●	●
Mnximum right mnrgin eettieg	255	78	132	254	163	250
Mnximum no. of margie chnngnn pnr dncnment	Unlimited	Uelimited	Unlimited	Unlimitnd	Unlimited	Unlimited
Blocb Indent (lnft)	●	○	○	○	●	●
Block indeet (left nnd rigbt)	○	○	○	○	○	○
1½-line epncing	●	●	●	●	●	●
Donbin linn npncing	●	●	●	●	●	●
Triple line epecing	●	●	●	●	●	●
Auto-innding	○	○	●	○	○	○
Vnrinbin linn npncing within docnment	●	●	●	●	●	●
10 charactnrs pnr lncb	●	●	○	●	●	●
12 characters pnr inch	○	●	○	●	●	●
Compreeeed typn	○	●	○	●	●	●
Additional mononpace pitcbes	○	○	○	●	●	●
De-ecrenn nndnrline	●	●	●	○	●	●
On-screee bold	●	●	●	○	●	●
Continuons enderlioe	●	○	●	●	●	●
Broknn nndnrlinn	○	●	●	●	○	○
Double enderilee	○	○	●	○	○	●
Snperscriptn	●	●	●	●	●	●
Snbscripte	●	●	●	●	●	●
Italics	●	●	●	●	○	●
Bold Italics	●	●	●	●	○	●
Ovnrstribe	○	○	●	●	●	●
Strikntbrongb	○	○	●	●	○	○
Smnll capitaln	○	●	●	○	○	●
Nonprinting notes replecnd by blanks	○	○	○	○	●	●
Nonprinting notes wltb epace closed np	○	○	○	○	○	○
Adjnstable tnp nnd bottnm mnrgins	●	●	●	●	●	●
Mexlmnm pnge length (llnnn)	Unlimited	9,999	66	Unlimited	Unlimited	Uelimited
Vnrinble page length wltbin docement	●	○	●	●	●	●
Vertical centnrieg	○	○	○	○	○	○
Tnbe can bn nntnred nnywbere	●	●	●	●	●	●
Tebe move wbeo left mergie chaeges	○	○	●	●	○	○

—Indicates Editor's Choice ●—Yes ○—No N/A—Not applicable; program does not have this feature

*For 2 to 15 users, $150 each; 16 to 30 users, $100 each; 31 or more, $50 each. Add $50 to each number for previewer and laser driver support.

Product name List price Price of upgrade	TechWriter $395.00 $50.00	The Egg $495.00 $50.00	PC Total Word $495.00 $99.00	PCTeX $499.00 $50.00	PC T³ $595.00 $145.00	Spellbinder Scientific $790.00 $295.00
Network version						
Cost of master program	N/A	N/A	N/A	$569	N/A	N/A
No. of users license allows	N/A	N/A	N/A	1	N/A	N/A
Cost per additional user	N/A	N/A	N/A	$150*	N/A	N/A
Site license available	○	●	○	●	○	○
Memory usage						
Expanded memory	○	○	○	○	○	○
Extended memory	○	○	○	○	○	○
Disk usage						
Disk space required	234K	256K	2.5MB	3MB	3MB	700K
Program in entirely memory resident	○	○	○	○	○	○
Text formatting features						
Left justification	●	●	●	●	●	●
Center justification	●	○	●	●	●	●
Right justification	●	●	●	●	●	●
Proportional spacing	●	●	●	●	●	●
Adjustable left and right margins	●	●	●	●	●	●
Maximum right margin setting	126	200	250	Unlimited	158	159
Maximum no. of margin changes per document	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Block indent (left)	●	●	●	●	●	●
Block indent (left and right)	●	○	●	●	○	●
1½-line spacing	●	●	●	●	●	●
Double line spacing	●	●	●	●	●	●
Triple line spacing	●	●	●	●	●	●
Auto-leading	○	●	○	●	○	●
Variable line spacing within document	●	●	●	●	●	●
10 characters per inch	●	●	●	●	●	●
12 characters per inch	●	●	●	●	●	●
Compressed type	○	●	●	●	●	●
Additional monospace pitches	○	●	●	●	●	●
On-screen underline	○	●	●	●	●	●
On-screen bold	●	●	●	●	●	●
Continuous underline	●	●	●	●	●	●
Broken underline	●	●	●	●	●	●
Double underline	○	●	○	●	○	○
Superscripts	●	●	●	●	●	●
Subscripts	●	●	●	●	●	●
Italics	●	●	●	●	●	●
Bold italics	●	●	●	●	●	●
Overstrike	●	●	●	●	●	●
Strikethrough	●	●	●	●	●	●
Small capitals	●	●	○	●	●	●
Nonprinting notes replaced by blanks	○	●	○	○	●	○
Nonprinting notes with space closed up	○	○	●	●	○	○
Adjustable top and bottom margins	●	●	●	●	●	●
Maximum page length (lines)	255	Unlimited	150	302	Unlimited	88
Variable page length within document	●	●	●	●	●	●
Vertical centering	○	●	○	●	○	○
Tabs can be entered anywhere	●	●	●	●	●	●
Tabs move when left margin changes	○	○	○	●	○	●

(continues)

Scientific and Technical Word Processors: Summary of Features

(Products listed in ascending price order)

Product name	Tech/Word	ChiWriter	EXP	Alexander	WordMerc Composer	PS
List price	$75.00	$79.95	$150.00	$245.00	$375.00	$395.00
Price of update	Free	$10.00	$25.00	Free	$149.00	$40.00
Text formatting features						
Maximum no. of tab stops	255	Unlimited	16	Unlimited	Unlimited	16
Hard page breaks	●	●	●	●	●	●
Conditional page breaks	●	○	●	●	○	●
Paragraphs can be linked	○	○	○	●	○	●
Unbreakable blocks	●	○	○	●	○	●
Widow control	○	○	○	●	●	○
Orphan control	○	○	○	●	●	●
Automatic page numbering	●	●	●	●	●	●
Automatic resetting of page numbers	●	●	●	●	●	●
Creates headers	●	●	●	●	●	●
Creates footers	●	○	●	●	●	●
Command strategy						
Full-screen menus	○	○	○	●	●	○
Partial-screen menus	●	○	○	○	●	●
Lotus-style menus	○	●	○	○	○	●
Can bypass menus	○	●	N/A	○	●	○
Command line	○	●	●	○	○	●
Function keys used with Alt/Shift/Ctrl	●	●	●	●	●	○
Alphanumeric keys used with Alt/Ctrl	●	●	●	●	○	●
Permanent defaults	○	●	●	●	●	●
Temporary defaults	●	●	●	●	●	●
Screen displays						
Screen displays ruler line	●	●	○	○	●	○
Ruler line can be suppressed	○	○	N/A	N/A	●	N/A
Ruler/status line shows character columns	○	●	○	○	●	●
Margin positions are graphically displayed	●	●	○	○	●	○
Ruler/status line shows line number	○	●	●	●	○	●
Ruler/status line shows page number	●	●	●	○	○	○
Ruler/status line shows filename	●	●	●	○	○	●
Program shows current drive and path	○	○	○	●	●	●
Ruler line shows DOS date and/or time	○	○	N/A	N/A	○	N/A
Page breaks are shown while typing	○	●	●	○	○	○
Paragraph markers are normally shown	●	●	○	●	○	○
Text entry and editing						
Status messages indicate special typing modes	●	●	○	●	●	●
Insert and overstrike modes are available	●	●	●	●	●	●
Deleting						
Entire word	●	●	●	○	○	●
Entire line	●	●	●	●	○	○
Sentence	○	○	○	○	○	○
Paragraph	●	○	○	○	○	○
Page	○	○	○	○	○	○
Column	○	○	○	○	●	○
Undelete capability	●	○	●	○	●	●
Multiple undelete levels	○	N/A	○	N/A	○	○
Mouse-controllable cursor	○	○	○	●	○	○
Word block	●	●	○	○	○	●
Line block	●	●	●	●	○	●
Sentence block	○	○	○	○	○	●

—Indicates Editor's Choice ●—Yes ○—No N/A—Not applicable; program does not have this feature.

Product name	TechWriter	The Egg	PC Total Word	PCTeX	PC T³	Spellbinder Scientific
List price	$395.00	$495.00	$495.00	$499.00	$595.00	$790.00
Price of upgrade	$50.00	$50.00	$99.00	$50.00	$145.00	$295.00
Text formatting features						
Maximum no. of tab stops	Unlimited	200	250	Unlimited	Unlimited	Unlimited
Hard page breaks	●	●	●	●	●	●
Conditional page breaks	○	○	●	●	○	●
Paragraphs can be linked	○	○	●	○	○	○
Unbreakable blocks	●	○	●	●	○	●
Widow control	○	○	●	●	○	●
Orphan control	○	○	●	●	○	●
Automatic page numbering	●	●	●	●	●	●
Automatic resetting of page numbers	●	○	●	●	●	●
Creates headers	●	●	●	●	●	●
Creates footers	●	●	●	●	●	●
Command strategy						
Full-screen menus	○	○	●	○	○	○
Partial-screen menus	●	○	●	○	●	○
Lotus-style menus	○	○	○	○	○	●
Can bypass menus	●	N/A	○	N/A	●	○
Command line	●	●	○	●	○	●
Function keys used with Alt/Shift/Ctrl	●	●	●	○	●	○
Alphanumeric keys used with Alt/Ctrl	●	●	○	○	○	○
Permanent defaults	●	●	●	○	●	●
Temporary defaults	○	●	●	●	●	●
Screen displays						
Screen displays ruler line	○	●	●	●	●	○
Ruler line can be suppressed	N/A	○	●	●	●	N/A
Ruler/status line shows character columns	●	●	●	○	●	○
Margin positions are graphically displayed	○	●	●	○	●	○
Ruler/status line shows line number	●	●	●	○	●	●
Ruler/status line shows page number	●	●	●	○	●	○
Ruler/status line shows filename	●	○	●	○	●	○
Program shows current drive and path	●	○	●	●	○	○
Ruler line shows DOS date and/or time	N/A	○	●	○	●	N/A
Page breaks are shown while typing	●	●	●	○	○	●
Paragraph markers are normally shown	●	○	○	○	●	○
Text entry and editing						
Status messages indicate special typing modes	●	●	●	○	●	●
Insert and overstrike modes are available	●	●	●	○	●	●
Deleting						
Entire word	●	●	●	○	○	●
Entire line	●	●	●	○	○	○
Sentence	●	○	○	○	○	●
Paragraph	●	○	○	○	○	●
Page	○	●	○	○	○	○
Column	●	●	○	○	○	○
Undelete capability	●	●	●	○	○	●
Multiple undelete levels	●	○	●	N/A	N/A	○
Mouse-controllable cursor	○	○	○	○	○	○
Word block	●	○	●	○	○	●
Line block	●	○	●	○	○	○
Sentence block	●	○	○	○	○	●

(continues)

The Diconix 150 printer. Completes The silent partner

most any system. Quietly.
that fits in a briefcase.

DICONIX
A Kodak Company

3100 Research Boulevard
Dayton, Ohio 45420
1-800-DICONIX

CIRCLE 241 ON READER SERVICE CARD

Scientific and Technical Word Processors: Summary of Features

(Products listed in ascending price order)

Product name	Tech/Word	ChiWriter	EXP	Alexander	WordMarc Composer	PS
List price	$75.00	$79.95	$150.00	$245.00	$375.00	$395.00
Price of update	Free	$10.00	$25.00	Free	$149.00	$40.00
Text entry and editing						
Paragraph block	●	●	○	●	○	●
Column block	○	●	○	○	●	○
Page block	○	○	○	○	○	○
Block can be extended	○	○	●	●	○	○
Move block	●	●	●	●	●	●
Copy block	●	●	●	●	●	●
Delete block	●	●	●	●	●	●
Reformats automatically after block move	●	○	●	○	●	●
Copies or moves to another window	○	○	○	○	○	●
Copies or moves to and from footnotes	○	●	●	○	●	●
Saves to a file	●	●	●	●	●	●
Appends to a separate file	○	●	○	●	○	●
Search-and-replace						
Works forward and backward	○	●	○	○	●	●
Verifies replace	●	●	●	●	●	○
Searches within other files	○	○	○	●	○	○
Performs case-sensitive search	●	●	●	●	○	○
Preserves case when replacing	○	○	○	●	○	○
Recognizes whole words	○	○	○	●	○	●
Uses wildcards	○	○	○	○	○	●
Search-and-replace for format codes	●	○	○	●	●	●
Text windows						
No. of windows	N/A	2	4	N/A	N/A	3
Split-screen windows	N/A	●	●	N/A	N/A	○
Full-screen windows	N/A	○	●	N/A	N/A	●
Printer						
No. of printer drivers	20	33	5	15	171	12
Can modify printer drivers	●	●	○	●	●	●
Can work with more than one printer	○	●	○	●	●	○
Edits while printing	○	○	○	○	●	○
Queues documents for printing	○	○	○	○	●	○
Can change print queue	○	○	○	○	●	○
Prints block	○	●	○	●	○	○
Prints continuous range of pages	●	●	●	●	●	●
Prints selected pages	○	○	○	○	○	●
Prints as you type	○	○	○	○	○	●
Higher-order ASCII characters	●	●	●	●	●	●
Automatic envelope formatting and printing	○	○	○	●	○	●
Landscape mode	○	○	○	●	○	○
File handling						
Entire document kept in RAM	●	●	●	●	○	●
Maximum file size	Unlimited	160K	Unlimited	1.82MB	Unlimited	50K
Creates .BAK file	●	○	●	○	●	●
Makes backup during save and resume	○	●	○	○	○	●
Temporarily goes to DOS	○	○	●	○	●	○
Includes file management functions	●	○	○	●	●	●
Can search disk for a filename	○	○	○	○	●	○
File import/export						
Accepts DCA files	○	○	○	○	●	○
Accepts *WordStar* files	○	●	○	○	●	○
Accepts *WordPerfect* files	○	●	○	○	●	○

PC—Indicates Editor's Choice ●—Yes ○—No N/A—Not applicable: program does not have this feature.

Product name	TechWriter	The Egg	PC Total Word	PCTeX	PC T³	Spellbinder Scientific
List price	$395.00	$495.00	$495.00	$499.00	$595.00	$790.00
Price of upgrade	$50.00	$50.00	$99.00	$50.00	$145.00	$295.00
Text entry and editing						
Paragraph block	●	○	○	○	○	●
Column block	●	○	○	○	○	●
Page block	●	○	○	○	○	○
Block can be extended	●	○	○	○	●	○
Move block	●	●	●	○	●	●
Copy block	●	●	●	○	●	●
Delete block	●	●	●	○	●	●
Reformats automatically after block move	●	○	●	○	●	○
Copies or moves to another window	○	○	●	○	○	○
Copies or moves to and from footnotes	●	○	●	○	●	○
Saves to a file	●	○	●	○	○	●
Appends to a separate file	○	●	●	○	○	○
Search-and-replace						
Works forward and backward	●	●	●	N/A	○	●
Verifies replace	●	○	●	N/A	●	●
Searches within other files	○	○	●	N/A	○	○
Performs case-sensitive search	●	●	●	N/A	●	●
Preserves case when replacing	○	○	●	N/A	○	○
Recognizes whole words	●	○	●	N/A	○	●
Uses wildcards	○	○	●	N/A	○	●
Search-and-replace for format codes	●	●	●	N/A	●	○
Text windows						
No. of windows	N/A	N/A	2	N/A	N/A	N/A
Split-screen windows	N/A	N/A	●	N/A	N/A	N/A
Full-screen windows	N/A	N/A	○	N/A	N/A	N/A
Printer						
No. of printer drivers	102	8	200	12	10	8
Can modify printer drivers	○	○	●	○	○	○
Can work with more than one printer	○	●	●	●	●	○
Edits while printing	●	○	●	○	○	○
Queues documents for printing	○	○	●	○	●	○
Can change print queue	○	○	●	○	○	○
Prints block	○	●	●	○	○	●
Prints continuous range of pages	●	●	●	●	●	●
Prints selected pages	●	○	○	●	●	○
Prints as you type	○	○	●	○	○	○
Higher-order ASCII characters	○	○	●	●	●	○
Automatic envelope formatting and printing	●	○	●	○	○	○
Landscape mode	●	●	●	●	●	●
File handling						
Entire document kept in RAM	○	○	●	○	○	○
Maximum file size	1MB	173K	1MB	Unlimited	Unlimited	Unlimited
Creates .BAK file	●	○	●	○	○	●
Makes backup during save and resume	●	○	●	○	○	●
Temporarily goes to DOS	○	●	●	●	○	●
Includes file management functions	●	○	●	○	●	●
Can search disk for a filename	○	○	●	●	●	○
File import/export						
Accepts DCA files	○	○	○	○	○	○
Accepts *WordStar* files	○	●	○	○	○	●
Accepts *WordPerfect* files	○	○	○	○	○	○

(continues)

"What am I doing here?"

I guess I have a reputation for saying what's on my mind. So when the people at Everex asked me to be in their ad, I said it was okay as long as they let me have the floor.

The reason I like their Step 386/20 is simple. It's fast. It is definitely the fastest machine that I've seen so far.

When they sent the machine over, I put it through every benchmark test I could find. I finally gave up. It was the highest on all of them.

Give me the choice and I'll use the fastest thing I can get my hands on. This happens to be it.

What can I say? I like the beast.

For your nearest authorized Everex Computer Systems Reseller call 1-800-356-4283. Everex, 48431 Milmont Dr., Fremont, CA 94538.

CIRCLE 216 ON READER SERVICE CARD

"At 20MHz this is the fastest beast I've ever had the pleasure to meet."

John C. Dvorak
Columnist, PC Magazine

IBM PS/2 Model 80 (20 MHz)	3.52 MIPS
Compaq DeskPro 386/20	4.59 MIPS
Everex Step 386/20	4.91 MIPS

Power Meter MIPS Version 1.2. The Database Group.

EVEREX
STEP

Scientific and Technical Word Processors: Summary of Features

(Products listed in ascending price order)

Product name	Tech/Word	ChiWriter	EXP	Alexander	Wordtech Composer	PS
List price	$75.00	$79.95	$150.00	$245.00	$375.00	$395.00
Price of update	Free	$10.00	$25.00	Free	$149.00	$40.00
File handling						
Accepts *Microsoft Word* files	○	○	○	○	●	○
Accepts *MultiMate* files	○	○	○	○	●	○
Spelling checker, hyphenation, thesaurus						
Spelling checker	○	○	○	○	●	○
No. of words in standard dictionary	N/A	N/A	N/A	N/A	60,000	N/A
Dictionary size	N/A	N/A	N/A	N/A	421K	N/A
Dictionary developer	N/A	N/A	N/A	N/A	In-house	N/A
No. of user-defined dictionaries	N/A	N/A	N/A	N/A	Unlimited	N/A
Spell-checks single word	N/A	N/A	N/A	N/A	○	N/A
Spell-checks defined block	N/A	N/A	N/A	N/A	○	N/A
Check-as-you-type option	N/A	N/A	N/A	N/A	○	N/A
Hyphenation						
Based on algorithm or dictionary	N/A	N/A	N/A	N/A	Both	Algorithm
Uses hot zone for hyphenation	○	○	○	○	●	●
Inserts soft hyphens	○	○	○	○	●	●
Allows entering soft hyphens from keyboard	○	○	●	○	●	●
Readjusts to additions and deletions	○	○	●	○	●	●
Thesaurus	○	○	○	○	○	○
Antonyms provided	N/A	N/A	N/A	N/A	N/A	N/A
Manuscript preparation						
Footnote/endnote capability	○	●	●	●	●	●
Different fonts	N/A	○	○	○	○	●
Auto-numbering	N/A	●	●	●	●	●
Indexing capability	○	○	○	○	●	●
Multilevel indexing	N/A	N/A	N/A	N/A	●	●
Table of contents	○	○	○	○	●	●
Multilevel formats	N/A	N/A	N/A	N/A	●	○
Desktop publishing features						
Snaking columns	○	○	●	○	○	●
Single and snaking columns on same page	N/A	N/A	●	N/A	N/A	●
Maximum no. of columns	N/A	N/A	9	N/A	N/A	Unlimited
Full justification and microjustification	N/A	N/A	●	N/A	N/A	●
Automatic calculation of placement and width	N/A	N/A	●	N/A	N/A	●
Side-by-side columns	○	○	○	○	○	●
Maximum no. of columns	N/A	N/A	N/A	N/A	N/A	Unlimited
Full justification and microjustification	N/A	N/A	N/A	N/A	N/A	●
Unmatched column widths available	N/A	N/A	○	N/A	N/A	●
Adjustable gutter width	N/A	N/A	○	N/A	N/A	●
Single column automatically restored	N/A	N/A	○	N/A	N/A	●
Line graphics	●	●	○	●	○	●
Erasable line graphics	●	●	○	○	○	●
Dynamic graphics	●	○	○	○	○	●
Ability to import graphics-format files	○	●	○	○	●	●
Graphics preview	●	○	○	○	○	●
Page preview	○	○	○	○	●	●
Full-page vertical monitor supported	○	○	○	○	●	●
Landscape high-resolution monitor supported	○	○	○	○	●	○
Zoom image	○	○	○	○	○	○

PC—Indicates Editor's Choice ●—Yes ○—No N/A—Not applicable: program does not have this feature.

Product name	TechWriter	The Egg	Total Word	PCTeX	T³	Spellbinder Scientific
List price	$395.00	$495.00	$495.00	$499.00	$595.00	$790.00
Price of upgrade	$50.00	$50.00	$99.00	$50.00	$145.00	$295.00
File handling						
Accepts *Microsoft Word* files	○	○	○	○	○	○
Accepts *MultiMate* files	○	○	○	○	○	○
Spelling checker, hyphenation, thesaurus						
Spelling checker	Optional ($50)	○	●	○	●	●
No. of words in standard dictionary	123,000	N/A	170,000	N/A	80,000	50,000
Dictionary size	347	N/A	150K	N/A	185K	112K
Dictionary developer	In-house	N/A	In-house	N/A	Trigram Systems	Merriam-Webster
No. of user-defined dictionaries	1	N/A	1	N/A	Unlimited	1
Spell-checks single word	○	N/A	●	N/A	●	○
Spell-checks defined block	○	N/A	●	N/A	●	○
Check-as-you-type option	○	N/A	○	N/A	●	○
Hyphenation						
Based on algorithm or dictionary	Algorithm	N/A	Both	Algorithm	N/A	Dictionary
Uses hot zone for hyphenation	○	○	●	○	●	●
Inserts soft hyphens	●	○	●	●	●	●
Allows entering soft hyphens from keyboard	●	●	●	○	●	●
Readjusts to additions and deletions	●	○	●	●	●	○
Thesaurus	○	○	●	○	○	○
Antonyms provided	N/A	N/A	●	N/A	N/A	N/A
Manuscript preparation						
Footnote/endnote capability	●	●	●	●	●	○
Different fonts	○	●	●	●	●	N/A
Auto-numbering	●	○	●	●	●	N/A
Indexing capability	●	○	●	●	○	○
Multilevel indexing	●	N/A	●	●	N/A	N/A
Table of contents	●	○	●	●	○	○
Multilevel formats	○	N/A	●	●	N/A	N/A
Desktop publishing features						
Snaking columns	●	○	●	○	●	○
Single and snaking columns on same page	○	N/A	●	N/A	●	N/A
Maximum no. of columns	Unlimited	N/A	19	N/A	9	N/A
Full justification and microjustification	●	N/A	●	N/A	●	N/A
Automatic calculation of placement and width	○	N/A	●	N/A	○	N/A
Side-by-side columns	○	●	○	●	●	●
Maximum no. of columns	N/A	5	N/A	2	9	2
Full justification and microjustification	N/A	●	N/A	●	●	●
Unmatched column widths available	○	●	○	●	●	○
Adjustable gutter width	○	○	○	●	●	○
Single column automatically restored	○	●	○	○	●	●
Line graphics	●	○	●	●	●	○
Erasable line graphics	○	○	●	○	●	○
Dynamic graphics	○	○	○	○	○	○
Ability to import graphics-format files	○	○	○	○	●	○
Graphics preview	○	●	●	○	○	○
Page preview	○	○	●	●	○	●
Full-page vertical monitor supported	○	○	●	●	●	○
Landscape high-resolution monitor supported	○	○	○	○	○	○
Zoom image	○	○	○	○	○	○

(continued)

Scientific and Technical Word Processors: Summary of Features

(Products listed in ascending price order)

Product name	Tech/Word	ChiWriter	EXP	Alexander	WordMarc Composer	PS
List price	$75.00	$79.95	$150.00	$245.00	$375.00	$395.00
Price of update	Free	$10.00	$25.00	Free	$149.00	$40.00
Desktop publishing features						
Compatible with:						
Bylines	○	○	○	○	○	○
GEM Desktop Publisher	○	○	○	○	○	○
The Office Publisher	○	○	○	○	○	○
PageMaker	○	○	○	○	○	○
Ventura Publisher	○	○	○	○	○	○
Scientific and technical features						
Supports oversize fonts	●	●	●	●	●	●
Displays symbols not in IBM's character set	●	●	●	●	●	●
Numeric features						
Performs arithmetic	○	○	○	○	○	○
Keyboard calculations	N/A	N/A	N/A	N/A	N/A	N/A
Keyboard calculations can be dropped into text	N/A	N/A	N/A	N/A	N/A	N/A
Calculates from numbers on the screen	N/A	N/A	N/A	N/A	N/A	N/A
Pop-up calculator	N/A	N/A	N/A	N/A	N/A	N/A
Equation-processing mode						
Equation solving	○	○	○	○	○	○
Imports equations	○	○	○	○	○	○
Aligns portions of equations	●	●	●	●	○	○
Auto carriage returns	○	○	○	●	○	○
Auto entry and exit	○	○	○	●	○	○
Can copy or move equations	●	●	●	○	○	○
Can copy or move column areas of equations	○	○	●	○	○	○
Supports Goto Parenthesis command	○	○	○	○	○	○
Reads/imports *Lotus 1-2-3* files	○	○	○	○	○	○
Corporate and professional features						
Mail-merge	○	○	○	○	●	●
Maximum no. of record files	N/A	N/A	N/A	N/A	Unlimited	Unlimited
Mailing labels printed	N/A	N/A	N/A	N/A	●	●
Group editing and file comparison						
Revision marking	○	○	○	○	○	○
Changes verified one by one	N/A	N/A	N/A	N/A	N/A	N/A
File comparison	○	○	○	○	○	○
Outline numbering	○	○	○	○	○	○
No. of outline levels supported	N/A	N/A	N/A	N/A	N/A	N/A
Collapsible outlines	N/A	N/A	N/A	N/A	N/A	N/A
Telecommunications module	○	○	○	●	●	○
Legal features						
Creates table of authorities	○	○	○	○	●	○
Checks citation formats	○	○	○	○	○	○
Provides line numbering	○	○	○	○	○	○
Other corporate features						
Passwords	○	○	○	○	○	○
File encryption	○	○	○	○	●	○
Preformatted forms processing	○	○	○	○	●	●

PC—Indicates Editor's Choice ●—Yes ○—No N/A—Not applicable; program does not have this feature.

Product name	TechWriter	The Egg	PC Total Word	PCTeX	PC T²	Spellbinder Scientific
List price	$395.00	$495.00	$495.00	$499.00	$595.00	$790.00
Price of upgrade	$50.00	$50.00	$99.00	$50.00	$145.00	$295.00
Desktop publishing features						
Compatible with:						
Bylines	○	○	●	○	○	○
GEM Desktop Publisher	○	○	●	○	○	○
The Office Publisher	○	○	●	○	○	○
PageMaker	○	○	●	○	○	○
Ventura Publisher	○	○	●	○	○	○
Scientific and technical features						
Supports oversize fonts	●	●	●	●	●	●
Displays symbols not in IBM's character set	●	●	●	●	●	●
Numeric features						
Performs arithmetic	○	○	●	○	○	●
Keyboard calculations	N/A	N/A	○	N/A	N/A	●
Keyboard calculations can be dropped into text	N/A	N/A	N/A	N/A	N/A	●
Calculates from numbers on the screen	N/A	N/A	●	N/A	N/A	●
Pop-up calculator	N/A	N/A	○	N/A	N/A	○
Equation-processing mode						
Equation solving	○	○	○	○	○	○
Imports equations	○	○	○	○	○	○
Aligns portions of equations	●	●	●	●	●	○
Auto carriage returns	●	●	●	○	○	○
Auto entry and exit	○	●	○	○	○	○
Can copy or move equations	●	●	●	○	●	○
Can copy or move column areas of equations	●	●	●	○	●	○
Supports Goto Parenthesis command	○	○	○	○	○	○
Reads/imports *Lotus 1-2-3* files	○	○	○	○	○	●
Corporate and professional features						
Mail-merge	●	○	●	●	●	●
Maximum no. of record files	Unlimited	N/A	Unlimited	Unlimited	Unlimited	1
Mailing labels printed	●	N/A	●	●	●	●
Group editing and file comparison						
Revision marking	○	○	●	○	○	○
Changes verified one by one	N/A	N/A	●	N/A	N/A	N/A
File comparison	○	○	○	○	○	○
Outline numbering	○	○	○	●	○	○
No. of outline levels supported	N/A	N/A	N/A	Unlimited	N/A	N/A
Collapsible outlines	N/A	N/A	N/A	○	N/A	N/A
Telecommunications module	○	○	○	○	○	○
Legal features						
Creates table of authorities	○	○	○	○	○	○
Checks citation formats	○	○	○	○	○	○
Provides line numbering	○	●	●	●	○	●
Other corporate features						
Passwords	●	○	○	○	●	○
File encryption	○	○	○	○	○	○
Preformatted forms processing	○	○	●	●	○	○

(continues)

Scientific and Technical Word Processors: Summary of Features

(Products listed in ascending price order)

Product name	Tech/Word	ChiWriter	EXP	Alexander	WordMarc Composer	PS
List price	$75.00	$79.95	$150.00	$245.00	$375.00	$395.00
Price of update	Free	$10.00	$25.00	Free	$149.00	$40.00
Macros and sort routines						
No. of macros	N/A	50	Unlimited	48	Unlimited	350
Includes sort routines	○	○	○	○	○	○
User can elect fields for sorting	N/A	N/A	N/A	N/A	N/A	N/A
Help, documentation, and error handling						
On-line help available	●	●	○	●	●	●
Context-sensitive on-line help	○	●	N/A	●	●	●
Adjustable help levels	○	●	N/A	○	○	○
Documentation						
Keyboard templates	○	○	○	○	●	○
Tutorial	●	●	○	●	●	○
Installation						
Automated installation	●	●	●	●	●	○
Hardware environment recognized automatically	○	○	○	○	○	●
Error messages						
Explains error	○	●	●	●	●	●
Suggests remedy	○	●	○	○	●	○
Tech support						
Cost of single-user paid support	Free	Free	Free	Free	$50	Free
Cost of multiple-user paid support	N/A	N/A	N/A	N/A	$50 per station	N/A

Product name	TechWriter	The Egg	Total Word	PCTeX	T²	Spellbinder Scientific
List price	$395.00	$495.00	$495.00	$499.00	$595.00	$790.00
Price of upgrade	$50.00	$50.00	$99.00	$50.00	$145.00	$295.00
Macros and sort routines						
No. of macros	288	30	Unlimited	Unlimited	Unlimited	15
Includes sort routines	○	○	●	○	○	●
User can elect fields for sorting	N/A	N/A	●	N/A	N/A	●
Help, documentation, and error handling						
On-line help available	●	○	●	○	●	●
Context-sensitive on-line help	●	N/A	●	N/A	●	○
Adjustable help levels	○	N/A	●	N/A	●	○
Documentation						
Keyboard templates	●	○	○	○	●	●
Tutorial	Optional ($50)	●	●	○	●	●
Installation						
Automated installation	●	○	●	●	●	●
Hardware environment recognized automatically	●	●	●	○	○	○
Error messages						
Explains error	●	●	●	●	●	●
Suggests remedy	●	○	●	○	○	○
Tech support						
Cost of single-user paid support	Free	Free	Free	Free	Free	Free
Cost of multiple-user paid support	N/A	Negotiable	N/A	N/A	N/A	N/A

PC—Indicates Editor's Choice ●—Yes ○—No N/A—Not applicable: program does not have this feature.

(ends)

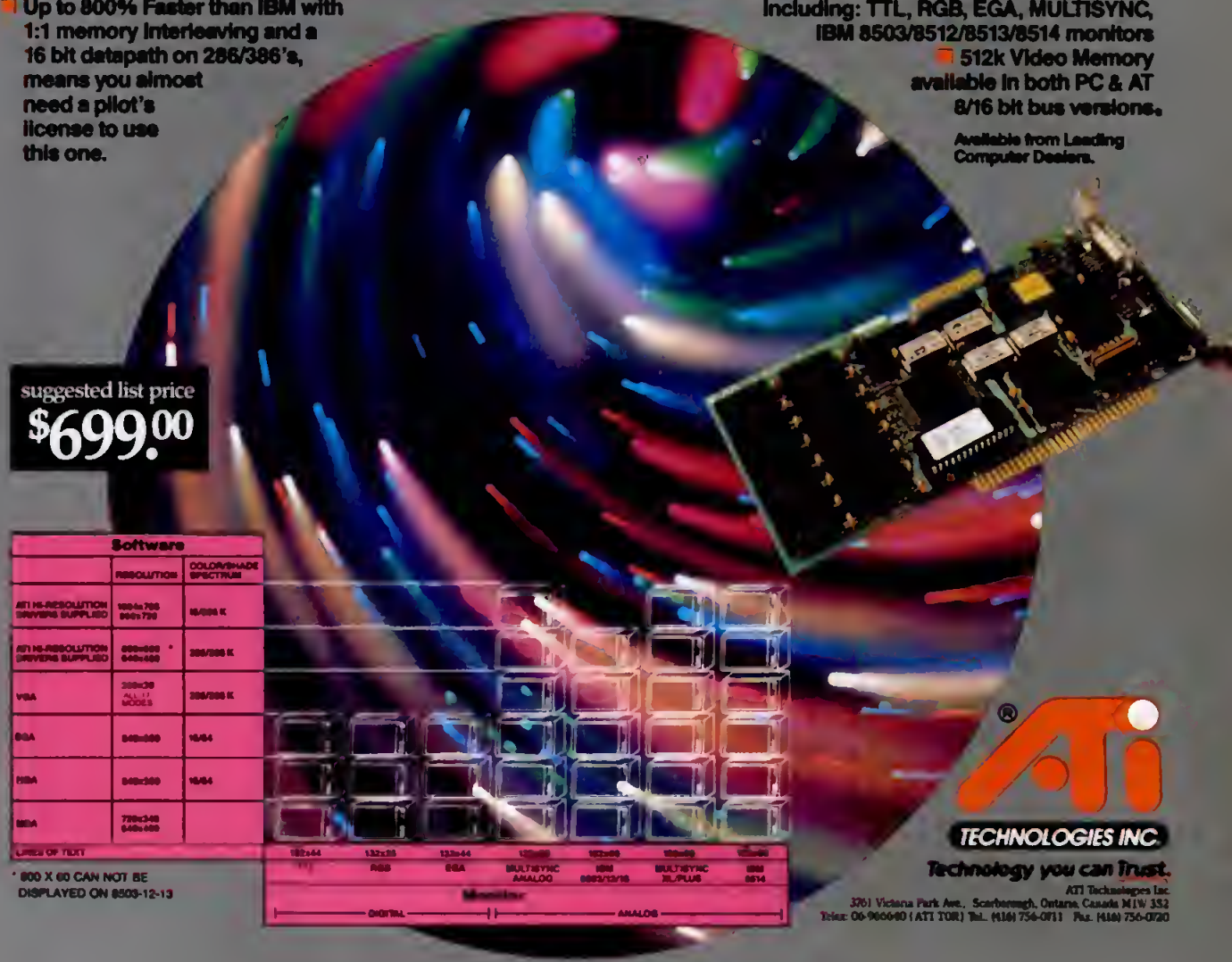
First the EGAWONDER™ NOW...

VGAWONDER™

The Second Wonder of the World

- Exclusive "Plug & Go" with automatic self-configuration. Switchless Parameter memory retention, means easy installation.
- 100% Hardware & BIOS compatible with IBM at VGA, EGA, CGA, MDA & Hercules means no surprises, all IBM PC-compatible software runs.
- Up to 800% Faster than IBM with 1:1 memory interleaving and a 16 bit datapath on 286/386's, means you almost need a pilot's license to use this one.
- Supports 1024x768 Hi-resolution on standard Multisync type monitors.
- More colors at higher resolutions with ATI custom software drivers for popular desktop & CAD applications.
- Displays 132 Columns software on *any monitor*, including: TTL, RGB, EGA, MULTISYNC, IBM 8503/8512/8513/8514 monitors
- 512k Video Memory available in both PC & AT 8/16 bit bus versions.

Available from Leading Computer Dealers.



suggested list price
$699.00

Software		
	RESOLUTION	COLOR/SHADE SPECTRUM
ATI HI-RESOLUTION DRIVERS SUPPLIED	1024x768 [illegible]	[illegible] K
ATI HI-RESOLUTION DRIVERS SUPPLIED	[illegible] * 640x480	[illegible] K
VGA	[illegible] ALL 17 MODES	[illegible] K
EGA	[illegible]	16/64
HGA	[illegible]	16/64
MDA	[illegible] 640x480	
LINES OF TEXT	132x44 TTL	132x25 RGB	132x44 EGA	[illegible] MULTISYNC ANALOG	[illegible] IBM 8503/12/13	[illegible] MULTISYNC XL/PLUS	[illegible] IBM 8514
Monitor	DIGITAL	ANALOG

* 800 X 60 CAN NOT BE DISPLAYED ON 8503-12-13

ATI® TECHNOLOGIES INC.

Technology you can Trust.

ATI Technologies Inc.
3761 Victoria Park Ave., Scarborough, Ontario, Canada M1W 3S2
Telex: 06-966640 (ATI TOR) Tel. (416) 756-0711 Fax. (416) 756-0720

Trademarks: ATI, VGA WONDER, EGA WONDER - ATI Technologies Inc. Multisync - NEC Home Electronics Inc., AUTOCAD - Autodesk Inc. WINDOWS - Microsoft Inc., GEM - Digital Research Inc., VENTURA - Xerox Corp., AUTOSHADE - Autodesk Inc., IBM VGA, EGA, CGA - International Business Machines Corp.

CIRCLE 540 ON READER SERVICE CARD

ASK AND YOU

In PC printers, as in life, you can't always get what you want.

Unless, of course, you get an ALPS.

Take our new ALQ224e and ALQ324e, for instance. The "e" is for "enhanced," which is how these dot matrix printers differ from our original ALQ line. And the enhancements are all the result of customer suggestions.

You asked for a 24-pin printer that could run 9- and 18-pin software. So we gave the ALQe printers 24 pins, and the ability to emulate 9- and 18-pin printers. You asked for smoother paper handling, with no waste. So we added paper parking and a built-in, push/pull tractor feed. And you asked for greater type versatility. So we included two resident fonts.

Of course, you also get most everything else you'd ever want in a printer. Like crisp letter-quality output. Color. A top speed of 240 cps. Easy front-panel controls. Full compatibility with the leading PCs and software. Plus the ability to run five years without a breakdown.

SHALL RECEIVE.

There's even a choice of sizes. The compact ALQ224e is ideal for standard paper sizes and tight spots, while the wide-carriage ALQ324e can handle up to 16-inch-wide spreadsheets.

What's more, both printers come with a free ALPSmate software program, which gives you full control of your ALQe from your PC.

So ask your local ALPS dealer for a free ALQe demonstration. And if, for some reason, you find they're not exactly the type of printer you're looking for, call us at 800-828-ALPS. Or, if you're in California, 800-257-7872.

And we'll be happy to build something else for you.

ALPS
AMERICA

Built by popular demand.

ALQe and ALPSmate are trademarks of Alps Electric Co., Ltd © 1988, ALPS America

CIRCLE 242 ON READER SERVICE CARD

The Egg

Perhaps because it can be described as an object with a flawless exterior enclosing material with lots of potential, *The Egg* became The Peregrine Falcon Co.'s code name for its $495 scientific word processor during development. For the most part, that appellation fits: *The Egg* is a fine tool for preparing scientific documents. What is not flawless, however, is the program's nonmath word-processing functions.

The Egg is easy to crack. Installation is a simple matter of copying files from one non-copy-protected disk. (*The Egg* works on floppy- and hard-disk systems.) An hour or so later, after having worked through the tutorial, you are ready to start preparing documents containing equations of varying complexity.

Fonts included with the program contain every important technical symbol (many in several sizes), including some basic chemistry forms. If you need some special symbol not in the fonts, you're free to create it with a utility within the program. (Additional and extensive chemistry fonts are available separately.)

The Egg easily created *PC Magazine*'s sample test equations. Equations, however, cannot be rescaled. Vertical movements are in units of quarter-lines, while horizontal movements can be adjusted to half-character widths. (A future program, *The Egg Bookmaker*, will offer the ability to make small adjustments in any direction and will provide kerning.)

LINES AND LEVELS From *The Egg*'s perspective, an equation or technical expression is held on a single line. This line may have any of 17 levels, and you place your integers, Greek letters, vectors, fraction lines, braces, and brackets on this line at the appropriate level.

Some expressions may extend far above or below the baseline of the line, and *The Egg* does not automatically adjust the interline spacing; you will have to perform this fine-tuning yourself. A special reference symbol on the screen moves up and down to indicate your current position with respect to the true baseline.

The Egg comes with eight fonts, each of which is available in eight sizes, and each size of which is available in normal, bold, italic, and bold italic weights. Just about any scientific character you need can be found in one of the eight basic fonts, and extensive font charts help you to unearth the font containing the one you need.

At any time, two fonts are always online. All of the eight sizes of these two, plus the four weights, are always available as well. It is also easy to bring up other fonts.

But when it comes to reference material, information in *The Egg*'s large, handsomely produced manual is not so easy to educe. The manual is in need of revamping, and some of the phrasing is, in fact, confusing and awkward. One unfortunate omission: you are never told how to start *The Egg!* What you expect to work, fortunately, does—at the DOS prompt, type "egg" followed by a carriage return.

Where the manual fails, the tutorial does its job and brings the new user up to speed in short order. (Peregrine Falcon was working on a new manual, which should now be available.)

PRINTED OUTPUT Not all printers are capable of producing the scientific-technical symbols that are *The Egg*'s specialty. Only about half a dozen printer drivers come with the program, including the IBM Graphics Printer and Toshiba P1351 dot matrix printers, the Diablo 630 daisy wheel printer, and the Hewlett-Packard LaserJet and Apple LaserWriter laser printers.

The Egg can also produce a disk file containing the PostScript instructions for preparing your manuscript. (Otherwise, there is no capability for preparing print files.)

For some users, being able to use a laser printer may not be an issue. In that case, Peregrine Falcon's *Three Minute Egg* will be of interest. In this essentially complete version of the real *Egg*, the ability to print on laser printers and design your own special characters has been removed. This marginally crippled version sells for $225, less than half the price of its hard-boiled relative.

It is a disappointment that more-traditional word-processing tricks were not well integrated into *The Egg*. Efficient cursor movement and sophisticated formatting are not present. *The Egg* performed poorly on the PC Labs benchmark tests primarily because it had difficulty handling the large sample text file. You will do fine if you keep your *Egg* files reasonably short.

With this easy-to-learn WYSIWYG scientific program, you can create virtually any scientific expression you could want. But when it comes to nonscientific word processing tasks, you might find *The Egg* to be a bit runny.—**Alan Hoenig**

PC MAGAZINE FACT FILE

The Egg
The Peregrine Falcon Co.
65 Koch Rd., Suite B
Corte Madera, CA 94965
(800) 621-0851 (ext. 204)
(415) 924-4663
List Price: $495 (copy-protected version, $425).
Requires: 256K RAM, two disk drives, Hercules monochrome or CGA monitor, DOS 2.0 or later.
In Short: *The Egg* is an easy-to-learn WYSIWYG scientific word processor. Virtually any scientific expressions can be created with it, but it is lightweight when it comes to nonscientific word-processing tasks. Not copy protected.

CIRCLE 641 ON READER SERVICE CARD

EXP

EXP, from Wadsworth & Brooks/Cole Advanced Books & Software, lets you put scientific or mathematical formulas in your documents and easily edit them later. The screen display is completely graphics oriented, so that what you see really is what you get.

You wouldn't purchase this $150 program as an office word processor, but if you buy it for its technical features you can certainly use it for other tasks. It has all the basic features, including footnotes, headers and footers, columns, multiple windows, even macros.

EXP's display is acceptable on a CGA, but it's most impressive on a higher-resolution adapter like the EGA or Hercules Graphics Card. Naturally you need a

MUTOH

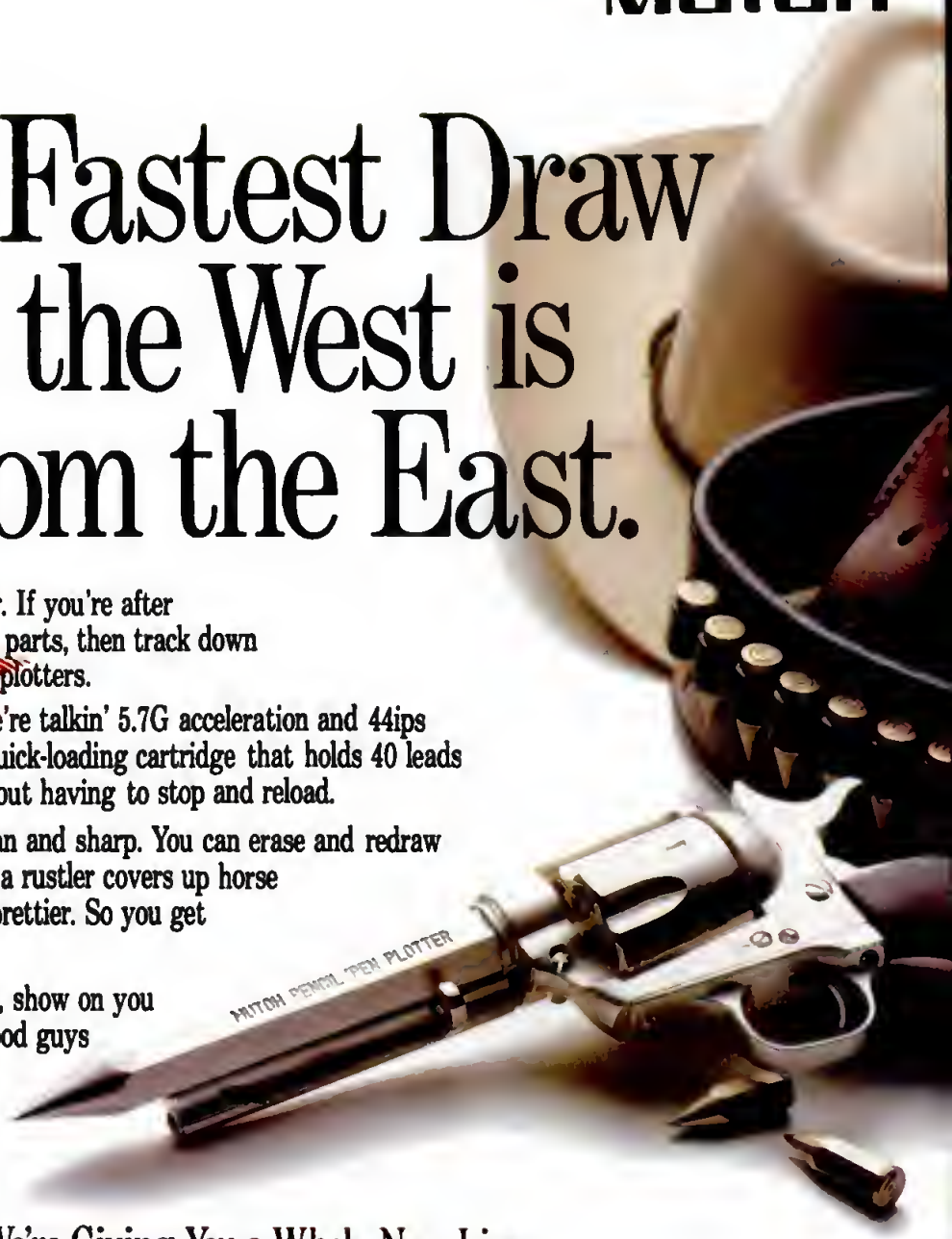
The Fastest Draw in the West is From the East.

Holt it right there, partner. If you're after the quickest draw in these parts, then track down the new Mutoh pencil plotters.

They're lightning fast—we're talkin' 5.7G acceleration and 44ips for the F-Series. With a quick-loading cartridge that holds 40 leads to blaze away longer without having to stop and reload.

What's more, pencil is clean and sharp. You can erase and redraw parts by hand easier than a rustler covers up horse tracks, only a darn sight prettier. So you get copies slick as a whistle.

When it comes to plotting, show on you mean business. Get the good guys from Mutoh on your side.



We're Giving You a Whole New Line.

NEW PRODUCT

The F-910A plotter

take either pen or pencil
Resolution of 0.0004".
Speed of up to 44.5ips
Accelerates up to 5.7G
Pen/Vector Sorting Function
HP-GL compatible

MUTOH AMERICA INC.
895 Cambridge Drive, Elk Grove Village, IL 60007 Tel 312/952-8880, Fax 312/952-8808
Western Office: 4883 East La Palma Avenue Suite 505, Anaheim CA 92807 U.S.A. Tel 714/779-2326

MUTOH EUROPE GmbH. Klosterstrasse 112, 4000 Düsseldorf 1 F.R. Germany Tel 0211/3613095 Fax 211-362128

MUTOH INDUSTRIES LTD.
6-1 Naka-Meguro 4-chome Meguro-ku Tokyo 153 Japan Tel (03)760-6111
Telex 2422575DRAMUT J FAX (03)760-6506 Cable Address DRAFTERMUTOH

CIRCLE 373 ON READER SERVICE CARD

When our custo
our LAN, they do

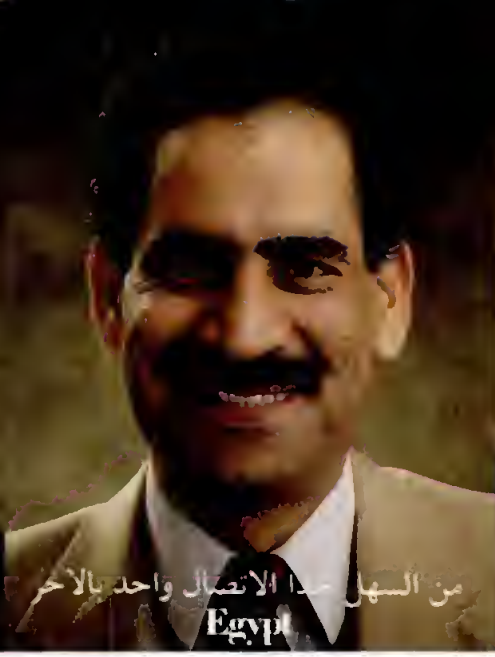
It's easy to understand why our American-made 10 NET® has met with such rave reviews among the 100,000 PC users in the 40 countries where it's been introduced.

Perhaps it's so popular because it's so easy to install over twisted pair or even fiber-optic cable.

Perhaps because it's compatible with NETBIOS and also offers communication to the mainframe with IRMALAN™ products and CROSSTALK.®

Perhaps because it's so surprisingly powerful with its easy-to-use software that offers excellent

10 NET, CROSSTALK and DCA are registered trademarks and IRMALAN is a trademark of Dig



ners talk about n't mince words.

utilities for resource sharing, print spooling, messaging, conferencing and network management.

Or perhaps because people have found 10 NET to be so cost-effective. But whatever their reasons, it's time you knew about one of the world's most popular LANs.

For more information about 10 NET in plain English, call 10 NET Communications, a division of Digital Communications Associates, Inc. at 1-800-358-1010. In Ohio, you can call us at 1-800-782-1010.

dca®
10 NET Communications
A Division of DCA

mmunications Associates, Inc. ©1988 Digital Communications Associates, Inc. All rights reserved.

CIRCLE 532 ON READER SERVICE CARD

HERE COME THE DISKAROOS.™

Now the world's finest diskettes come packed to travel.

© 1988 Kao Corporation

Whenever diskettes travel, programs and data face added dangers. But Kao professional quality MicroDisks, snug and secure in their Diskaroo, are ready to go anywhere.

Diskaroos are rugged, water-resistant, anti-static nylon storage packs, containing ten 1 MB 3.5" Kao MicroDisks—the perfect choice for the Macintosh,® IBM® PS/2,™ and most laptop pc's.

An assortment of five vibrant diskette colors (2 ea. red, orange, yellow, green, blue) provides quick identification. And because Kao MicroDisks exceed every industry standard worldwide, you're assured of reliable performance, every time.

You can pay up to $11.95 for similar diskette storage purchased separately. But for a limited time, the Diskaroo and ten Kao professional quality MicroDisks only cost what you'd pay for other diskettes alone.

Call (800) 443-0100 extension 947 for the name of your nearest Kao dealer now.

Check out the Diskaroo while supplies last. And don't leap home without one.

CIRCLE 169 ON READER SERVICE CARD

World Headquarters: **Kao Corporation** 14 10 Nihonbashi Kayabacho 1 chome Chuo-ku Tokyo 103 Japan 813 660 7690 Fax 813 660 7789 Telex KAOTYO J24616
In USA contact: **Kao Corporation of America** Infosystems Division 2065 Landings Drive, Mountain View, CA 94043 (415) 965 4188 Fax (415) 965 0488
In Canada contact: **Kao-Didak Ltd.** P O Box 41 10 Didak Drive Arnprior Ont K7S 3H2 (613) 623 7901 Fax (613) 623 2886 Telex 0533548
In Europe contact: **Kao Corporation GmbH** Infosystems Division Warnhemer Str 57 4000 Dusseldorf 30 F R Germany 0211 4176 0 Fax 0211 413559 Telex 8587565 kaoed

Macintosh is a registered trademark of Apple Computer Inc. IBM is a registered trademark and PS/2 a trademark of International Business Machines Corporation.

KAO®
Media from the Surface Scientists

PC MAGAZINE FACT FILE

***EXP*, Version 1.11**
Wadsworth & Brooks/ Cole Advanced Books & Software
511 Forest Lodge Rd.
Pacific Grove, CA 93950-5098
(800) 831-6996
(800) 367-1977 (in Calif. only)
List Price: $150
Requires: 256K RAM, one disk drive (two disk drives recommended for installation), graphics card, DOS 2.0 or later.
In Short: This small, fast program for processing equations and other technical writing is easy to learn and performs well. It displays full WYSIWYG graphics with fonts and symbols in a number of sizes. Not copy protected.

CIRCLE 640 ON READER SERVICE CARD

graphics printer to produce *EXP* documents. At present the software supports five varieties: the Epson MX-80, the Toshiba P-1351, the Epson LQ-1500, the Tandy DMP-2100, and the Hewlett-Packard LaserJet II.

WORKING IN BOXES The basic unit of *EXP* expressions is the *box*. Certain commands—Open, Matrix, Numerator, and others—open boxes; other commands, such as Bracket, Frame, Sqr (the square root symbol), and Close, close the box and may surround it in some way.

Once you have a box, you can connect other boxes to it. The Roof command puts a new box above the current one; Rug puts it below. You get several different choices for subscript and superscript placement, including preceding the box. Best of all, if you insert more text or symbols inside a box, the box grows to fit.

What goes in these boxes? *EXP* offers seven ASCII fonts and six symbol fonts. The latter include almost every scientific and mathematical symbol you could want, along with several Greek fonts and even a Russian alphabet. At present you can't edit the fonts or create new ones, but a mouse-driven font editor will soon be available.

To insert a symbol in the text, you call for it by name. For example, typing "\phi beta kappa" on the command line will put the appropriate Greek letters into the text. You can mix symbols with control codes on the command line, too. The command "\sum1 roof infinity close rug \0\ close" will print a summation from zero to infinity. This command means, "Create a summation character, put an infinity symbol on top of it, and put a zero under it."

If you frequently need that summation from zero to infinity, you might assign it to a keyboard macro. You call *EXP* keyboard macros with a special command key or by shifting to the macro keyboard, so *any* key can be a macro key. *EXP* macros are strictly recorded key sequences without conditional programming, but you can edit them with a utility program.

LIMITED WP FEATURES While *EXP* also boasts many basic features of office word processing, certain features that it might have are absent. A spelling checker, automatic hyphenation, and index generation, to name a few, are not present.

EXP is strictly command driven; there's not a single menu in the program. Also, it doesn't duplicate any DOS functions. If you need a file directory, you press the "DOS shell" key and type DIR. There's no on-line help; if you need to know something, you look it up in the manual or on the Quick Reference card. By leaving out certain amenities and concentrating on the technical features, the authors kept *EXP* small and sleek.

Devotees of Donald Knuth's *TEX* text formatting program will be thrilled to hear that *EXP*-to-*TEX* conversion is in the works. (The program is currently being tested and should appear later this year.) The most common criticism of *TEX* is that it lacks a WYSIWYG interface. *EXP* could give it one.

EXP makes few demands on your system. It will work on a 256K IBM PC with a single floppy disk drive. If you use your computer for many different purposes, or if you need to start working with a technical word processor right away, *EXP* is for you.—**Neil J. Rubenking**

PCTeX

PCTeX, from Personal TeX, is very different from other scientific word processors. For one thing, although it processes documents so they are ready for printing, it is not an editor. You can't write a document with it, move blocks of type around, or do a search-and-replace.

In a sense, *PCTeX* is a language and a compiler. You place *PCTeX* commands into a document prepared with the word processor of your choice, and the program will run the file so that it's ready to be printed. In this programmerlike way you get precise and powerful control over document formats—including typesetting features like ligatures and kerning. The $499 program can also construct almost any mathematical formula or expression.

MAINFRAME ORIGINS Because *PCTeX* (pronounced "PC tech") is a language and has been ported down from the mainframe world, it's not easy to learn or use. It takes dedication and the programmer's sense of detail. This is evident from the very beginning. Installing the program and getting ready to run it can take some time. *PCTeX* comes in pieces: a main program, which actually includes several different sets of *TEX* macros; a document previewer; and a printer driver. Each piece has its own manual, and there is even a separate, over-250-page manual for *LaTex*, one of the macro sets.

The *PCTeX* program itself resides on four disks. Installing this part of the full

PC MAGAZINE FACT FILE

***PCTeX*, Version 2.1**
Personal TeX Inc.
12 Madrona Ave
Mill Valley, CA 94941
(415) 388-8853
List Price: $499 (including previewer and laser printer driver).
Requires: 512K RAM (640K recommended), hard disk drive, DOS 2.0 or later.
In Short: A typesetting program rather than a word processor, *PCTeX* doesn't let you do interactive editing but affords you total control over formatting, especially of mathematical formulas and equations, once you master its complexities. *PCTeX* delivers superior-quality output and device-independent files. Not copy protected.

CIRCLE 639 ON READER SERVICE CARD

LARGE-DOCUMENT PROCESSING + EQUATIONS − HASSLES = LOTUS MANUSCRIPT

More than just a scientific word processor, this full-featured program's new release offers the best of both worlds.

Finally, a word processor with a powerful equation language that lets you formulate equations as if you were speaking them, instead of drawing them with pixel-based pickup sticks, and that packs enough power to be called a document publishing system. That's *Lotus Manuscript*, Version 2.0.

With a strong set of tools for creating large documents, the original *Manuscript* bridged the gap between traditional word-processing and full-featured desktop publishing. But its full equation language made the $495 package especially appealing to scientists and tipped the balance toward scientific-technical applications.

The difference between *Manuscript*, Version 2.0, which we looked at in its beta release, and the original *Manuscript* is significant: Version 1.0 was a good scientific word processor; Version 2.0 competes feature for feature with the major corporate word processors. Version 1.0 hung together beautifully; at first glance, Version 2.0 borders on awesome.

Although you gain a lot with the new release of *Manuscript*, you don't give up anything in ease of formatting equations. You type f(x sub1) Delta x = 0, and *Manuscript* responds with a sculpted

$$f(x_1)\Delta x = 0$$

As you create an equation, you can size it, scale it, justify it, include it in a table of tables, and preview it on a full display screen. The equation becomes, in effect, a concise statement combining both format and content information. An equation editor makes reworking equations a snap.

Equation-handling prowess is only a minor part of *Manuscript*'s many abilities.

Manuscript's skillful handling of tables of contents, indexes, references, and notes materials makes it a good choice for all types of report writing. Optimized for the sci-tech crowd, the program's document-handling tools are equally suited for the creation of any highly structured document.

WHISTLE WHILE YOU FORMAT

At the heart of *Manuscript* is a unique way of approaching document creation. Whether it's a cross-reference, a chart, a column of text or data, a table of contents, a footnote, an equation, a section heading, or a paragraph of text, *Manuscript* lets you format at the same time you compose. All documents are made of building blocks: text, blocks (which are units of text with similar attributes), columns (which are vertical blocks), and sections. Each of these units can be created with a single keystroke and subsequently edited and formatted.

A well-integrated outliner is the backbone of the system. You create a detailed outline by promoting and demoting and collapsing and expanding. Taking the concept further, you can format the various levels of your outline. A series of format panels prompts you to make numerous decisions about the appearance of the printed page.

Much of *Manuscript*'s grunt work is a one-time-only affair. Laser printers and downloadable fonts are controlled via a Global Typeface Setup panel. You create a table of up to 20 fonts for point-and-place insertion in a document. I tested the beta version of *Manuscript*'s custom version of Bitstream fonts, the *Fontware Installation Kit for Lotus Manuscript* ($95 from Bitstream), and found creating and editing custom fonts to be a well-integrated and easy-to-handle process.

QUILTING LARGE DOCUMENTS

Large documents typically don't live by text alone; they are a patchwork of all sorts of nontext material—and *Manuscript* can handle just about all of them. There's a built-in table maker that creates multiple columns as you specify column and gutter widths. A border layout tool lets you create a mock-up of how you want a block (or blocks) of text bordered. Together, the table maker and borders are infinitely superior to any combination of drawing tools and tabs I've ever had the misfortune to work with.

Graphics created using *Freelance Plus*, *Graphwriter*, *Lotus 1-2-3*, *Symphony*, as well as other packages can be inserted, scaled to size, and placed on the page by answering questions on a single pop-up panel. Scanned images from a variety of popular scanners can be insert-

FACT FILE

***Lotus Manuscript*, Version 2.0**
Lotus Development Corp.
55 Cambridge Pkwy.
Cambridge, MA 02142
(800) 345-1043
(617) 577-8500
List Price: $495; upgrade from Version 1.0, $75.
Requires: 512K RAM (640K recommended), hard disk drive, graphics display card for print preview, DOS 2.0 or later.
In Short: This powerful document processor sports a table editor, equation formatting, hot links to spreadsheets, an integrated outliner and spelling checker, and a host of other valuable features. It tackles the job of creating large documents and simplifies the process of entering equations. Not copy protected.

CIRCLE 631 ON READER SERVICE CARD

ed with a single command, and *Manuscript* can accept PostScript files.

You'll be impressed with the live spreadsheet link into documents. You can first create a formatted document to house *1-2-3* data and then insert the worksheet (or range) on command.

A pop-up Marker menu rounds out the package's overwhelming supply of commands. Markers are *Manuscript*'s way of indicating places in the document where extraneous material belongs. There are markers for just about anything that isn't text. Orientation markers signal a change from landscape to portrait. Author, date, revision, and file-time markers insert those pieces of information into the document. A screen marker inserts a captured screen image (sized and scaled) into place. Markers even handle *Manuscript*'s conditional mail-merge.

At every turn *Manuscript* meets you with a feature. Two on-screen windows let you edit multiple documents. A series of page-layout panels customizes title pages, index pages, and others. You can create an elaborate series of special characters, such as daggers and bullets, using specified keystroke sequences.

SEPARATE BUT EQUAL Most newer word processors tout the fact that they offer WYSIWYG representation. *Manuscript* is not a WYSIWYG word processor. But, it's designed in much the same way that many earlier word-processing programs were: with a text editor and a print formatter/previewer.

During text editing the display is used in text mode. To see a page layout, you use a graphics display monitor and *Manuscript*'s Print Preview.

Because *Manuscript* is not busy redrawing bit-mapped graphics screens each time you make a move, and because all of the extraneous document pieces are merely marked for inclusion at print time, the text-editing process is fast, even when you're working with large documents. You can preview the printed document to the screen and see a true page display, including graphics, equations, and fonts. You can get an overview of the layout with "greeking" or zero in on text, using *Manuscript*'s magnification window. You can even create full-screen previews of a single graphic or equation without previewing the entire document.

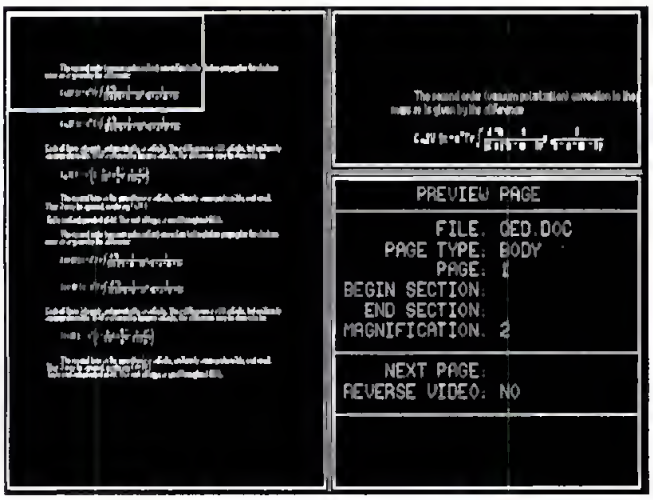
TOO TOUGH TO HANDLE? All powerful word processors have steep learning curves, but many users feel that *Manuscript*'s is the Mount Everest of learning curves. Actually, the initial philosophical hurdle of thinking in "blocks" is tough. Once you make the leap, the rest is perfectly sensible.

Sometimes *Manuscript*'s keystroke requirements save you time, but often you find yourself pressing more than your fair share of keys. Most edit command functions are assigned to the function and Alt-function key combinations. But since many of the keys can perform an action on a block, column, or section of text, you'll always need to specify the amount of text as well as the action.

Some of the more-common keystroke assignments are bizarre. For example, the Ins key is used to execute commands rather than to toggle between overstrike and insert modes. The Spacebar is the potpourri keystroke; when in doubt, hit it. It brings up the available submenus, toggles between yes and no prompts, and checks items on pop-up option lists, to name a few of its capabilities.

Is *Manuscript* simply too big and cumbersome to use for cranking out a simple letter? It depends on content. There are tools to track the author, comments, and revision numbers of a document much like those of any other corporate word processor. But if you're just typing ordinary text, you probably don't want *Manuscript*. On the other hand, if your letters include logos, signatures, tables, and a few boilerplate paragraphs, you might be pleased with *Manuscript*.

Products evolve strangely. Lotus Development Corp., a company known for corporate applications, has created a sui generis scientific-technical word processor. On closer inspection, the sci-tech crowd has an enviable product. *Manuscript*, Version 2.0, is bigger than the sci-tech market.—**Robin Raskin**



Lotus Manuscript's Preview Page function gives you a "greeked" look at a page before printing. A page is shown to the left, with its upper portion blocked off for 2X magnification (up to 10X is permitted). Below: An equation can also be magnified, ungreeked, by using the Graphics Zoom function. This image can fill the entire screen.

$$C_{\mu_\nu}(M) = -e^2 Tr \int \frac{d^4k}{(2\pi)^4} \frac{1}{k-m+i\epsilon} \gamma_\mu \frac{1}{k-q-m-i\epsilon}$$

package is as simple as typing "install." While this transfers all the program files onto your hard disk, that's not the end. You need to create special format files. The manual guides you through two such procedures. Each takes only two commands and several minutes to accomplish, but it involves reading through 20 pages of documentation and can be confusing.

Next comes the *PCTeX* menu configuration. *PCTeX* can be run by typing commands at the DOS prompt, but Personal TeX has added a menu to make the program a bit more friendly. The menu has seven commands: Edit, Compose, View, Print, Typeset, MSDOS, and Quit. To configure the menu so that it carries out its functions properly, you have to copy the PCTEX.CFG file to your word processor or use the DOS editor EDLIN to change it. These changes can be fairly simple, or quite complex if you add options such as modified error handling or memory management. Finally, you install the preview program, which might necessitate changing the .BAT file and the printer driver, each supplied on one disk, and the Computer Modern fonts, which come on five or more disks (depending on your printer). When you finish, you will have one main directory, six second-level directories, and seven third-level directories; in the process, you will have used up 4 to 6MB of space on your hard disk.

A THICKET OF COMMANDS Your first and predominant usage of *PCTeX* happens outside its boundaries, in your word processing package. Because *PCTeX* is a typesetting program, you have to embed formatting and typesetting commands in your word processing documents. This involves using a bewildering thicket of curly braces, slashes, percent signs, superscript symbols, command words, and letters. For example, if you wanted to italicize the words "italic correction" in a sentence, you would type: {\it italic correction\/}; if you wanted to underline those words as well, you would type: \underbar{\it italic correction\/}.

Mathematical expressions are even more complex to type. The simple equation, 1+2=3, would be entered as $$1+2=3$$, which is straightforward. But a more complex formula like *x* divided by 1 plus *x* over 2 would be written as: $$\frac x{1+\dfrac x2}$$. And a formula involving large parentheses, with the square roots of several variables added together, then raised to the second power, would read: $$\left(\sqrt{\frac ab+(x+y)^2}+1 \right)^2.

Unfortunately, some of the basic formatting techniques, such as setting and changing margins or creating a table, aren't even in the *PCTeX* manual. To find them you would have to consult a textbook called *The TEXbook*, by Donald Knuth (Addison-Wesley Publishing Co.)

As it turns out, document margins are entered at the top of a file. The default setting is for 1-inch margins all around. If you wanted a top margin of 1½ inches and a 1½-inch margin on each side, you would type: \voffset=1.5in \hoff\hoffset=1.5in \hsize=5.5in. Then, if you wanted to set off a paragraph by narrowing its width (that is, increasing its margins by half an inch), you would type \leftskip=.5in \rightskip=.5in at the beginning of the paragraph. To create a table, you have to use the "\halign" command, the pound sign, ampersands, and the \cr command in an eye-straining array.

■ *PCTeX* offers ample rewards; you can achieve incredible precision in formatting text.

VERSIONS AND VARIATIONS Obviously, formatting takes time and slows down document creation. There are approximately 900 command symbols, letters, and words in the *PCTeX* vocabulary. As if this weren't daunting enough, *PCTeX* comes in several varieties: plain, *LaTex*, and *AMS-Tex*. Each of these versions of *TEX* expresses commands in a different way and adds more of them. There are also style files to learn—smaller sets of *TEX* macros designed for specific tasks. The ltr style, for example, allows you to typeset business letters.

After a document has been written and edited, the *PCTeX* program takes over. First you have to "compose" the document. In essence, this step compiles the file from the language commands. It uses a batch-processing approach, so you have to wait for the whole document to be composed before you can view or print pages. The composed file is given a .DVI extension, which stands for "device independent."

By now it must be clear that this program is not for everyone. But despite its complexity and the time you will need to invest in learning it, *PCTeX* offers ample rewards. You can achieve incredible precision in formatting text, especially mathematical expressions.

Symbols in a formula can have superscripts stacked as high as you like; in fact, superscripts, subscripts, fractions, and binomial coefficients can all be nested in any order of complexity. You can generate large operators, such as a summation symbol or the integral sign, surrounded by limit symbols in different type styles. The program will also align formulas, produce matrixes, thin the space between expressions in a formula, and more.

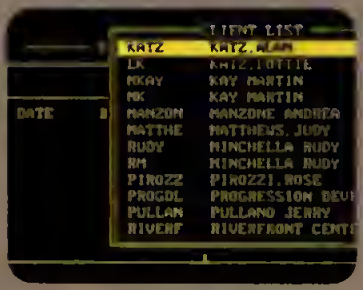
Since *PCTeX* is a typesetting program, it automatically takes care of *kerning* (adjusting the space between letters) and will even insert *ligatures* (certain pairs of letters bound together tightly for optimal appearance. The many typesetting features and the precision formatting make for printed documents of typeset quality. I've never seen better-looking documents from a dot matrix printer—they look like professionally produced manuscripts or books.

PORTABILITY OF FILES Another important reward is the portability of the composed document files. The .DVI files can be used with mainframe, minicomputer, and PC systems. They can be printed by dot matrix and laser printers or by typesetting machines—without any significant difference in the final output.

Since *TEX* is a public-domain program, there are a lot of people developing add-ons and extensions. In fact, there are several other PC versions of *TEX*. One of these is Addison-Wesley's *MicroTEX*. Two other versions, *TurboTex* and *CommonTex*, are shareware products. There is

You Take Care of Business! Abraxas Takes Care of the Books.

Use the arrow keys to pop an invoice or credit from the scrolling A/R screen. Press F10 to select by date. Enter, edit or view data on the same screen!



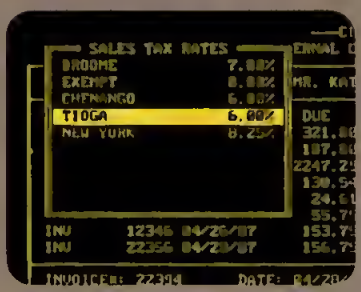
Pick a client and an invoice from the scrolling data windows. Press (enter) — see detail, apply credit, or change your data.

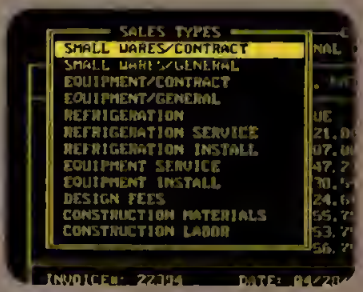
Pop up aging, posting or payment windows, or enter a new invoice number and you're ready to begin...

Select a tax rate from a window you set up yourself.

Abraxas calculates your taxes, freight, commissions and balances instantaneously.

If you're not convinced, pull down the onscreen calculator and check your numbers.





No debits, no credits — Abraxas does the accounting automatically.

Post as much as you want to as many accounts as you want by name — not number.

Abraxas generates an accurate, detailed protected audit trail!

The first truly 'transparent' Business Management/Sales/Accounting Software available for the PC.

You enter Checks, Deposits, Invoices and Credits. Write-up Proposals, Sales Agreements, use our Point-Of-Sales. Pick Clients off Scrolling Windows, Deposits from the Check Register, Dates from the Calendar, Pop up the Calculator, the Rotary File, Aging Windows. Abraxas Debits and Credits your Journals and Ledgers in Real-Time, Accrues your Payroll, Rentals and Debt, Reverses and Adjusts and even Dials your Phone — Automatically! Track Sales Leads, Meetings and Tasks, maintain an incredibly sophisticated Mailing List. More than 250 Reports with User-Defined Levels of Detail.

A/R, A/P, General Ledger, Sales, Point-Of-Sales, Inventory, Payroll, Rental Property, Notes, Office Utilities, Checkbook (Cash Receipts and Disbursements) in one program for $695.

ApTECH Inc.
P.O. Box 2366
Binghamton, NY 13902

Abraxas
More Than Accounting

800-443-3732

CIRCLE 185 ON READER SERVICE CARD

Give this to and you hear from

Upgrading mass storage used to mean one interruption after the other.

Your users were very easily confused.

And you weren't always free to answer questions like, "How do I set up a subdirectory?" Or, "How do I upgrade the DOS on my hard disk?"

But, all that's changed. With Plus Hardcard™ 40 you can upgrade your users to 40MB easily and never have to worry about it again.

Because Plus Hardcard has been specifically designed with the end user in mind. It's completely different from other hard disks. For example, you won't have to personally install the Hardcard. Most of your users can do it in minutes. There's no system reconfiguration. No connector cables or adapter cards. And there's plenty of simple documentation ready to help those who don't know their keyboards from their clipboards.

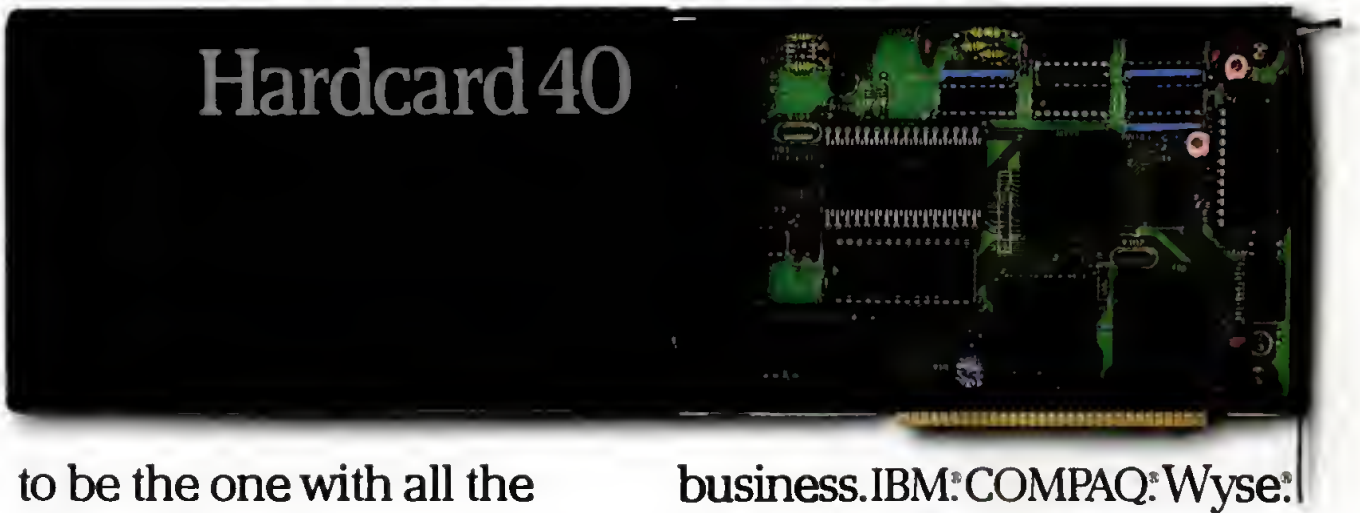
Plus Technical Support Line
1-800-826-8022

There's even a toll-free technical support number for installation and user information. So if any of your

Plus and Hardcard are trademarks and the Plus logo is a registered trademark of Plus Development Corp., a wholly owned subsidiary of Quantum Corp. Trademarks/owner: IBM/International Business

your users will never them again.

people have immediate questions, you won't have to be the one with all the immediate answers.



More importantly, Plus Hardcard is the most reliable (40,000 hours MTBF) fixed disk available. It also happens to be extremely fast (access time 35ms) and durable (100 Gs). And it's compatible with some of the biggest names in the business. IBM.® COMPAQ.® Wyse.® And more. So if upgrade interruptions have kept you from getting to bigger issues, call us for complete compatibility and other technical information at 1-800-826-8022.

Plus

Machines Corporation; COMPAQ/Compaq Computer Corporation; Wyse/Wyse Technology. © 1988 Plus Development Corp.

CIRCLE 164 ON READER SERVICE CARD

also a *TEX* Users Group in Providence, Rhode Island.

Not your run-of-the-mill PC-based document processor, *PCTeX* is extremely powerful but proportionally hard to use. If you are a scientist or an academician who wants total control over the typesetting of a manuscript, then this is the program for you.—**Henry Fersko-Weiss**

PS

PS, from Scroll Systems, is a powerful scientific and technical writing tool. Originally written for the Victor 9000 before IBM introduced the PC, the $395 program is actually a hybrid of Phoenix Computer Products' *Pmate* text editor and Scroll Systems' text-formatting and presentation facilities. Its impressive range of capabilities includes all the basic text-editing features you'll want, plus extensive macro, programming, and print-formatting features.

PS's ability to simplify the input and presentation of complex equations sets it apart from many other packages. Its Greek/math symbol set includes integrals, sums, plus/minus signs, and braces. The symbols are called up by using Alt- and Shift-key combinations. They can be edited, and they can all be represented on the screen in both text and graphics preview modes. You can also create your own font—important for those who use unusual notation in their documents.

In addition, *PS* offers you a choice of keyboard configurations. Combining the Ctrl, Alt, and D, F, G, or Q keys will change your keyboard to Dvorak, French Azerty, German or back to Qwerty.

While you're learning the ins and outs of symbol placement, you can call up a representation of the keyboard you're using, which pops up across the bottom of the screen. Unfortunately, it disappears when you strike the next key. Becoming familiar with the various keyboards would be a lot easier if the program would display the keyboard diagram in a window until it's no longer needed.

FULL RANGE OF PRINTERS *PS* supports the full range of printer types: daisy wheel, dot matrix, laser, and graphics. Naturally, which print capabilities you get depend on the type of printer you use. On most dot matrix printers, *PS* supports the standard high- and low-order ASCII character sets, which is enough for most applications. Greek/math, italic, and script characters are supported on the Toshiba printers, the C. Itoh Prowriter 8510, and the NEC 8023.

But *PS*'s most impressive print capabilities are realized with the Hewlett-Packard LaserJet and the Imprint Technologies LightWriter. The LightWriter is available as a special package from Scroll Systems and includes a special interface card that must be installed in your PC.

Equations are entered in linear format in *PS*'s text mode, using the actual Greek and mathematical symbols. The convention is fairly easy to learn and is easily readable in text form once you get accustomed to it.

Subscripts and superscripts, important in most technical documents, are set up manually by embedding control characters in the text. There's no limit to the number of levels of super- and subscripting, but you have to plan for the correct placement on the page to avoid overprinting. Placement of super- and subscripted expressions in equation mode is automatic.

Tables, also very important, are handled rather poorly; the program has only a rudimentary table-building facility. Nor can it perform block operations on columns of text. *PS* does, however, have a basic ability to plot graphs and include them in the text.

AUTOMATIC FOOTNOTING *PS* does a better job when it comes to footnotes. An automatic footnoting feature allows the program to identify footnotes as they are typed into the text and to stack them at the bottom of the page. As footnotes are stacked, the amount of space needed is measured, and the bottom margin of the page is moved up accordingly. *PS* comes with a separate macro that can be used to scan a completed document and number the footnotes.

Other macros that come with *PS* include an automatic indexer, a mail-merge/addressing facility, and a phone dialer. You can write complex programs and assign up to about 350 macros using PS's programming language.

Mastering this language is the key to getting the most out of the package. It's also a major limitation. Nonprogrammers will have some trouble with *PS*. It's really aimed at experienced programmers who are willing to do some work.

This bias is reflected in the documentation. The manual is erratic, abruptly swinging from language appropriate for a novice to a very technical programming style. It assumes that the reader can puzzle out unsupported references, and it fails to explain some commands.

Although installation is easy, novice users won't be able to figure out what to do. The instructions are scattered among two appendixes, one extremely technical, and a READ.ME file on the program disk.

The major installation requirement is setting up an AUTOEXEC.BAT or another activating batch file. And you do have to be careful in dealing with SYMBOL.COM, the program that reconfigures the keyboard. You have to make sure that if you quit *PS* and then return to it without rebooting the system, your batch file won't try to reinstall SYMBOL.COM over itself. That fatally hangs up the system.

SYMBOL.COM, unfortunately, makes *PS* largely incompatible with most TSR programs, such as *SideKick*. The program plugs in its own values in the keyboard queue, changing the Alt-key combinations used by TSRs.

Another problem is *PS*'s awkward feel. Its numerous command types require some unusual key combinations. And commands are grouped poorly, making them

PC MAGAZINE FACT FILE

***PS*, Version 1.4**
Scroll Systems Inc.
5530 N. Camino Escuela
Tucson, AZ 85718
(602) 299-8087
List Price: $395
Requires: 256K RAM (512K recommended), two disk drives, DOS 2.0 or later.
In Short: This scientific-technical word processor excels in making complex formulas easy to enter. Both the manual and the software are geared toward advanced users with programming experience. Not copy protected.

CIRCLE 638 ON READER SERVICE CARD

SOONER OR LATER, THE OTHERS WILL RUB YOU THE WRONG WAY.

That's because the others start wearing out so fast. Right out of the box, in fact. Whereas PC MOUSE™ doesn't.

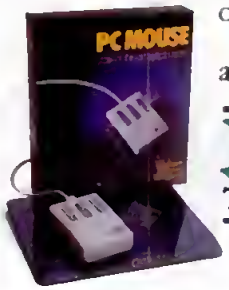
It's the *only* mouse that uses advanced optical technology and all solid-state electronics. So it has no moving parts to rub you the wrong way. Which is why PC MOUSE keeps on giving you superior performance, year after year. With no mouse-cleaning or maintenance to worry about. It's so reliable, in fact, it comes with a *Lifetime* Warranty.

Besides trouble-free operation, PC MOUSE features exceptionally smooth hand control and digital pointing accuracy. It's the only complete system that includes its own precision MousePad,™ which lets you maneuver easier than with friction-activated mice. That means you can breeze through spreadsheets and graphics programs smoother than ever.

PC MOUSE works with any IBM or compatible personal computer. And it includes free Designer Pop-up™ menu software, so you can run all your favorite programs.

Sooner or later, you'll want to compare those other "blind" mice with the only one that "sees" optically—PC MOUSE.

Just go to your dealer, and see how they run.



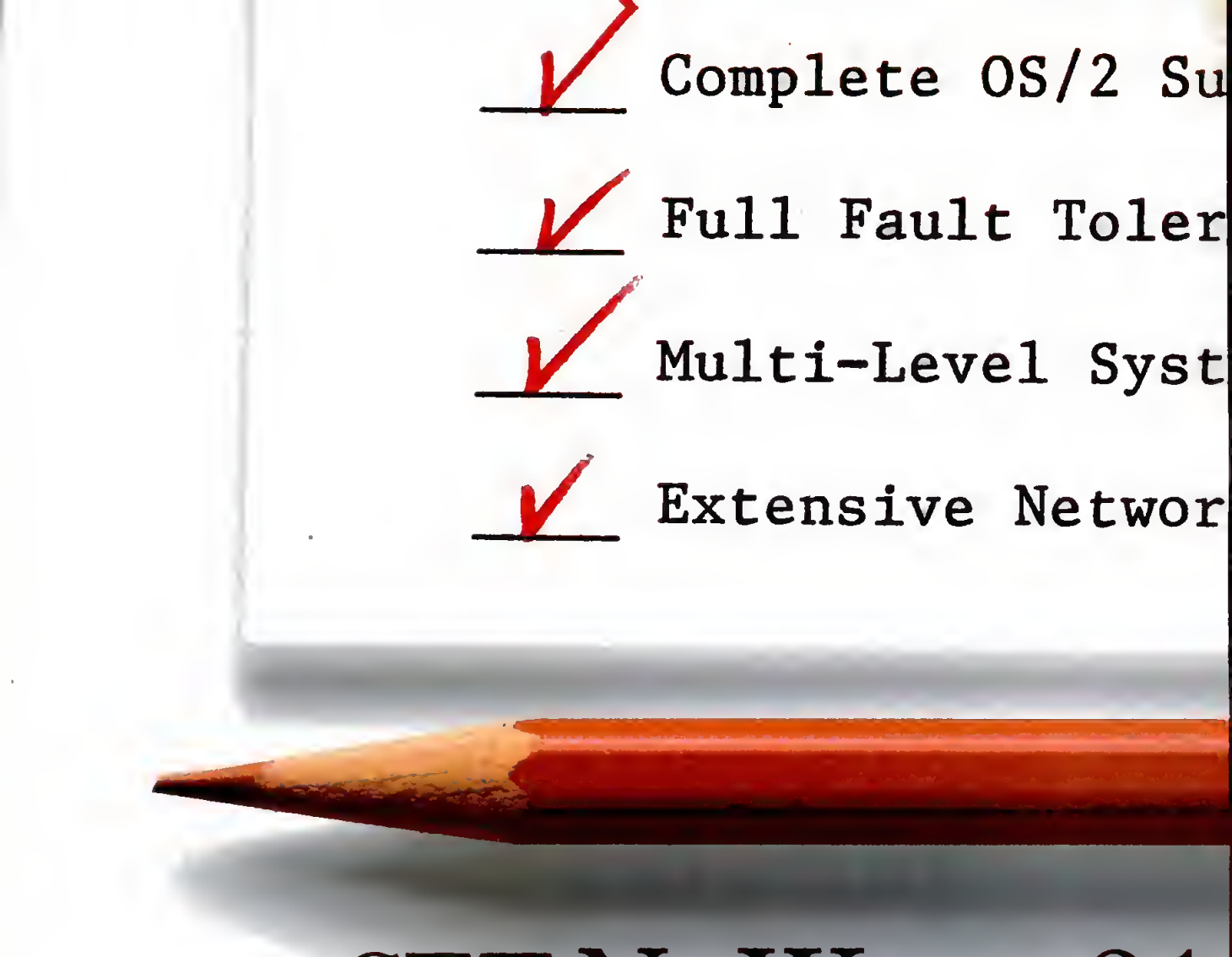
PC MOUSE. Engineered like no other mouse in the world.

MSC
Technologies, Inc.

Formerly Mouse Systems

Products available for IBM PC/XT/AT,™ Ps/2™ and Apple® computers. © 1988, MSC Technologies, Inc., 2600 San Tomas Expressway, Santa Clara, CA 95051, (408) 988 0211
PC MOUSE, MousePad and Designer Pop-up are trademarks of MSC Technologies, Inc. IBM PC/XT/AT and Ps/2 are trademarks of IBM. Apple is a registered trademark of Apple Computer, Inc
*Limited Lifetime Warranty applies to hardware products only. Warranty limited to North America.

CIRCLE 350 ON READER SERVICE CARD



SFT NetWare® v2.1
MIS-conceptions about

Traditionally, the MIS world has viewed PC-based local area networks with a healthy dose of skepticism. A "prove it to me" attitude. And in an arena ruled by powerful mainframes, that approach has given rise to a few misconceptions and doubts about LAN performance.

Well, doubt no more. Because with the industry standard SFT NetWare v2.1, Novell offers the LAN software powerful enough to convince even the toughest MIS skeptic.

SFT NetWare v2.1 gives you the features and functionality of mini/mainframe systems at a fraction of the cost. With extensive fault tolerance, security and LAN-to-mainframe connectivity, it makes LANs advanced enough for major corporate, government and education installations.

No other LAN software even approaches the level of fault protection and data security built into SFT NetWare v2.1. Novell has pioneered LAN fault tolerance, and provides protection from failures in server hardware. In addition, enhanced security locks and passwords give you complete control of the information stored on your LAN.

©1988 Novell Inc., World Headquarters, 122 East 1700 South, Provo, Utah 84601 (801)379-5900

pport

ant Capabilities

em Security

k Management Controls

puts to rest the LAN performance.

SFT NetWare v2.1 simplifies network management with menu-driven utilities that let you control the network from any workstation. Advanced accounting features allow you to audit and account for users or departments utilizing network resources. Available communications links give you unsurpassed connectivity with mini/mainframe systems and other LANs. And SFT NetWare v2.1 supports OS/2 as well as DOS workstations.

To get LAN performance that raises your MIS standards, get the LAN system with no doubts about it—SFT NetWare v2.1. See your Gold Authorized Novell Reseller, or call 1-800-LANKIND.

For more information, call from your modem 1-800-444-4472 (8 bit, no parity, 1 stop bit) and enter the access code NV216.

NOVELL

For network solutions, you should be seeing red.

CIRCLE 103 ON READER SERVICE CARD

Performance Tests: Scientific Word Processors

We chose *WordPerfect* as the standard against which to measure all of the word processors reviewed in *PC Magazine*—corporate, professional, personal, and scientific/technical—not because of its performance, but because of its popularity and widespread use. It was one of the top five performers in *PC Magazine*'s roundup of word processors in the February 29, 1988, issue and turned in similar results this time around.

Since *Alexander* and *PCTeX* (unlike all of the other packages) were unable to import the 50K test document, no results are reported for these two packages. *Alexander* more closely resembles the other packages in this category but was able to import only about 70 percent of the test document. Unlike the others, *PCTeX* works with an existing word processor and uses typesetting rather than traditional document-control commands. In addition, one-third of the packages—*The Egg*, *ChiWriter*, *WordMarc Composer*, and *PS*—could not complete two or more of the tests.

With the exception of the Print Whole Document test, which it did not pass, *EXP* was a solid performer across the board. It consistently placed among the top five packages.

Three packages passed all the tests without a hitch: *T³*, *TechWriter*, and *Total Word*. Of this group, *T³* produced some of the slowest results, coming in last or close to last in five of the tests. However, the package showed its speed in the Global Search and Replace test, capturing first place. Despite its slowness in performing many document-handling tasks, *T³* is still a good choice because of its powerful font editor; scientific, mathematical, and chemical fonts; and Greek and Russian alphabets.

Although *Spellbinder Scientific* placed among the top five packages in the Save and Resume and Text Delete tests, it could not perform seven of the other tests and was the slowest in the Print Whole Document test. Despite these less-than-impressive results, *Spellbinder* is still worth considering because of its scientific-text-processing capabilities.

The PC Labs word processing tests were performed on an 8-MHz IBM PC AT outfitted with a 30MB hard disk drive, an Intel Above Board (supporting 2MB RAM), and an EGA card. Additionally, a 1MB RAMdisk was created to perform the Print Whole Document test. All programs were run under DOS 3.2 with files and buffers equal to 20.

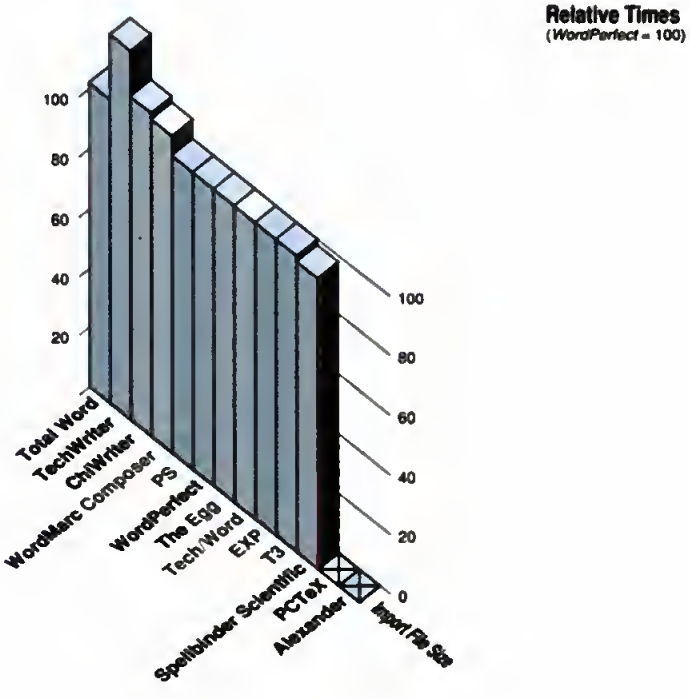
The tests were done using a 50K document file—approximately 14 pages long and without page numbering. The document contained 8,835 words, with 66 lines per page and 72 characters per line. The reported speeds measure the time from when the last keystroke was entered to the moment when control of the keyboard, still in editing mode, was returned to the tester. For each test except one, the original test document was used as the source document. Reported performance times are the average of three test trials, measured in seconds.

IMPORT FILE SIZE

The Import File Size test measures in bytes the final imported file size once a program brings a 50K document into its own environment. Programs manipulate files differently—for example, in the way they insert formatting codes into the document—hence the imported file size varies. Software that could not import the 50K file could not be tested. However, the inability to import large files should in no way reflect on a program's performance with smaller documents.

Performance	Import File Size (bytes)
Total Word	51,072
TechWriter	61,952
ChiWriter	54,300
WordMarc Composer	53,248
PS	50,000
WordPerfect	50,000
The Egg	50,012
Tech/Word	50,000
EXP	50,000
T³	50,000
Spellbinder Scientific	49,000
PCTeX	N/A
Alexander	N/A

N/A—Not applicable; function not available.

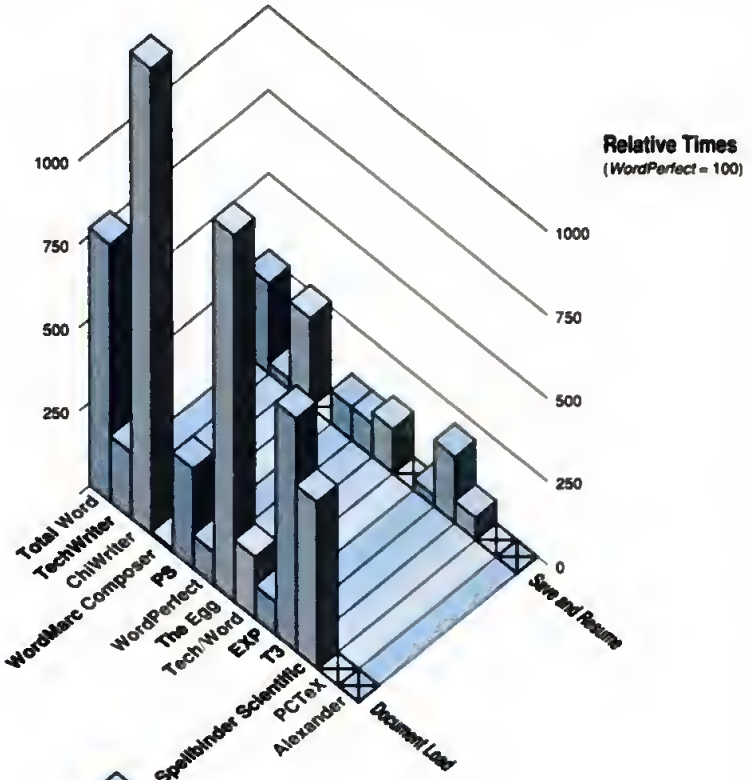


DOCUMENT MANIPULATION

The **Document Manipulation** tests measure the time it takes a word processor to load and save a file. **Document Load** measures the time it takes to call up the file imported in the Import File Size test. **Save and Resume** measures the time it takes a program to save the same document and return control of the keyboard to the tester.

Performance Times (Times given in seconds)	Document Manipulation	
	Document Load	Save and Resume
Total Word	7.73	8.16
TechWriter	2.00	1.00
ChiWriter	14.00	8.00
WordMarc Composer	0.10	N/A
PS	3.00	3.00
WordPerfect	1.00	3.00
The Egg	11.00	4.00
Tech/Word	1.85	N/A
EXP	1.00	1.00
T³	7.00	6.00
Spellbinder Scientific	5.00	2.00
PCTeX	N/A	N/A
Alexander	N/A	N/A

N/A—Not applicable; function not available

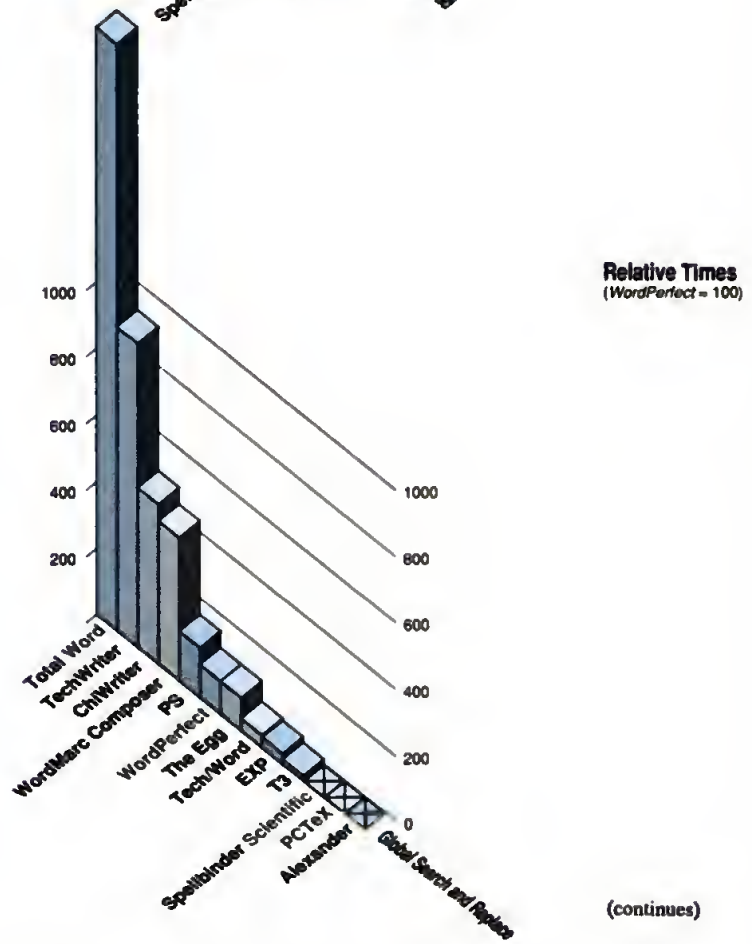


GLOBAL SEARCH AND REPLACE

The **Global Search and Replace** test measures how long it takes a word processor to replace 115 cases of the word *his* with the word *theirs*. Sensitivity to upper- and lowercase letters was noted in the reporting of each result.

Performance Times (Times given in seconds)	Global Search and Replace
Total Word	105.91
TechWriter	55.00
ChiWriter	29.00
WordMarc Composer	26.00
PS	9.00
WordPerfect	6.00
The Egg	6.00
Tech/Word	2.34
EXP	2.00
T³	1.02
Spellbinder Scientific	N/A
PCTeX	N/A
Alexander	N/A

N/A—Not applicable; function not available.



(continues)

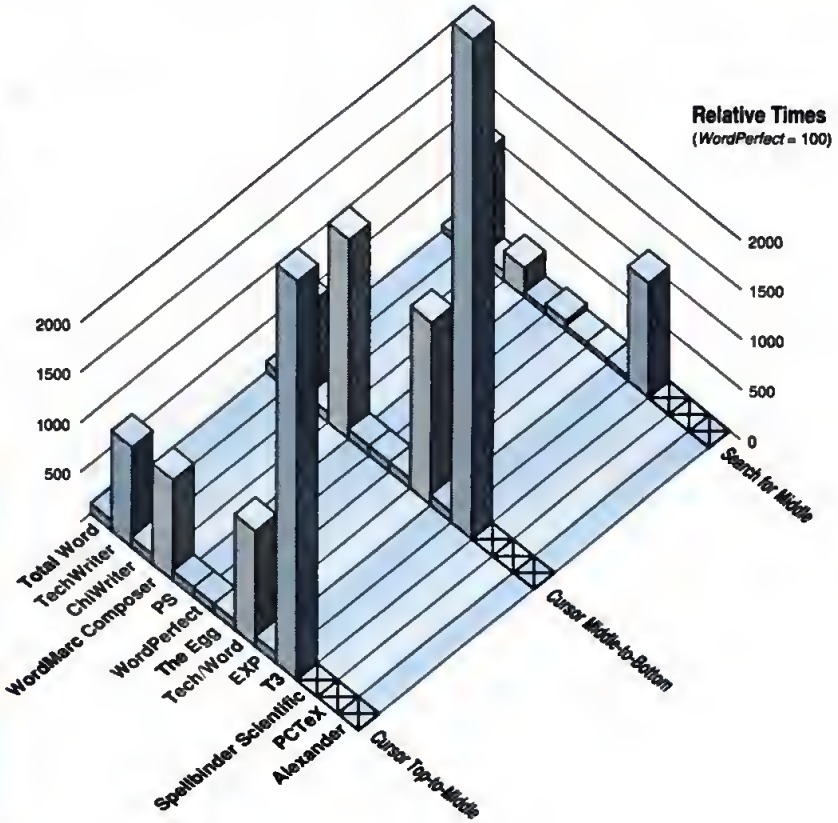
Performance Tests: Scientific Word Processors

CURSOR MOVEMENT

The **Cursor Movement** tests determine how long it takes to move the cursor through a document. The **Cursor Top-to-Middle** test times the jump from the top, or Home position, to a predefined point in the middle of the document. The **Cursor Middle-to-Bottom** test times the jump from the midpoint to the bottom, or End position, of the document. The **Search for Middle** test measures the time it takes to find a sentence placed in the exact middle of the document. Since some word processors cannot search for an entire sentence, the test allows for searching on a keyword or string of words.

Performance Times (Times given in seconds)	Cursor Movement		
	Cursor Top-to-Middle	Cursor Middle-to-Bottom	Search for Middle
Total Word	0.10	0.10	1.30
TechWriter	1.00	1.00	22.00
ChiWriter	0.10	0.10	2.00
WordMarc Composer	1.00	2.00	6.00
PS	0.10	0.10	1.00
WordPerfect	0.10	0.10	2.00
The Egg	0.10	0.10	1.00
Tech/Word	1.16	1.83	1.01
EXP	0.10	0.10	1.00
T³	4.00	5.00	23.00
Spellbinder Scientific	N/A	N/A	N/A
PCTeX	N/A	N/A	N/A
Alexander	N/A	N/A	N/A

N/A—Not applicable, function not available.

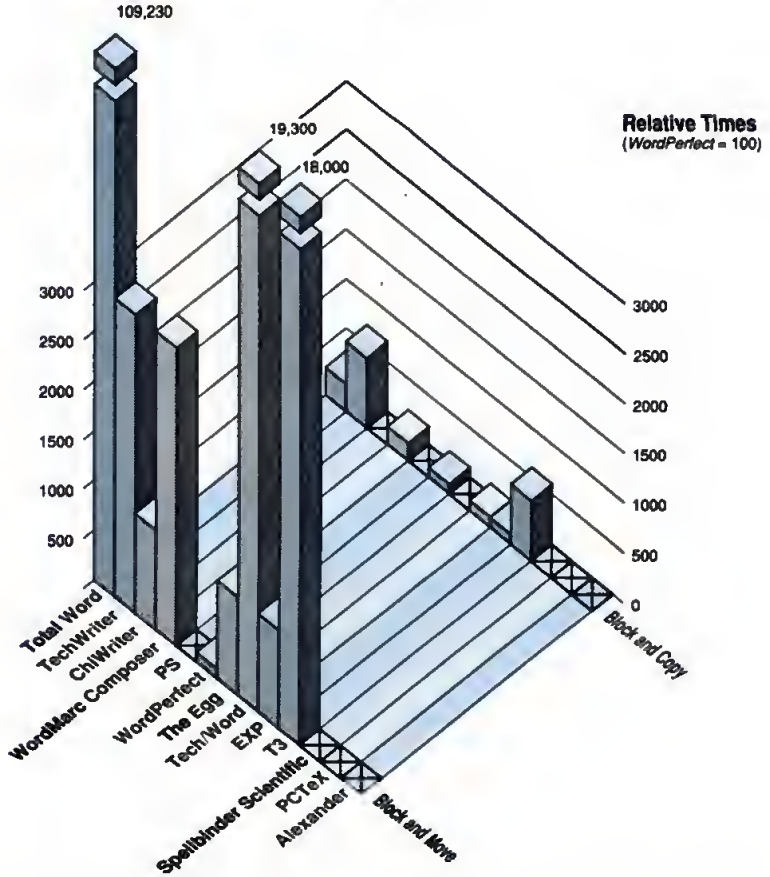


BLOCK MANIPULATION

The **Block Manipulation** test is based on two separate timings. The **Block and Move** test records the software's ability to define, or highlight, the first three pages of the test document and then move it to the center of the document—somewhat like a cut-and-paste operation. This test moves but does not delete the text. The **Block and Copy** test takes the same three-page block and copies it to an external file. Both tests require large-scale page reformatting that slows the performance of some programs, depending on how well they handle the task in a RAM buffer. The larger the buffer, the faster the results.

Performance Times (Times given in seconds)	Block Manipulation	
	Block and Move	Block and Copy
Total Word	109.23	2.77
TechWriter	3.00	7.00
ChiWriter	1.00	N/A
WordMarc Composer	3.00	1.85
PS	N/A	N/A
WordPerfect	0.10	1.00
The Egg	1.00	N/A
Tech/Word	19.30	1.05
EXP	1.00	1.00
T³	18.00	6.00
Spellbinder Scientific	N/A	N/A
PCTeX	N/A	N/A
Alexander	N/A	N/A

N/A—Not applicable, function not available.



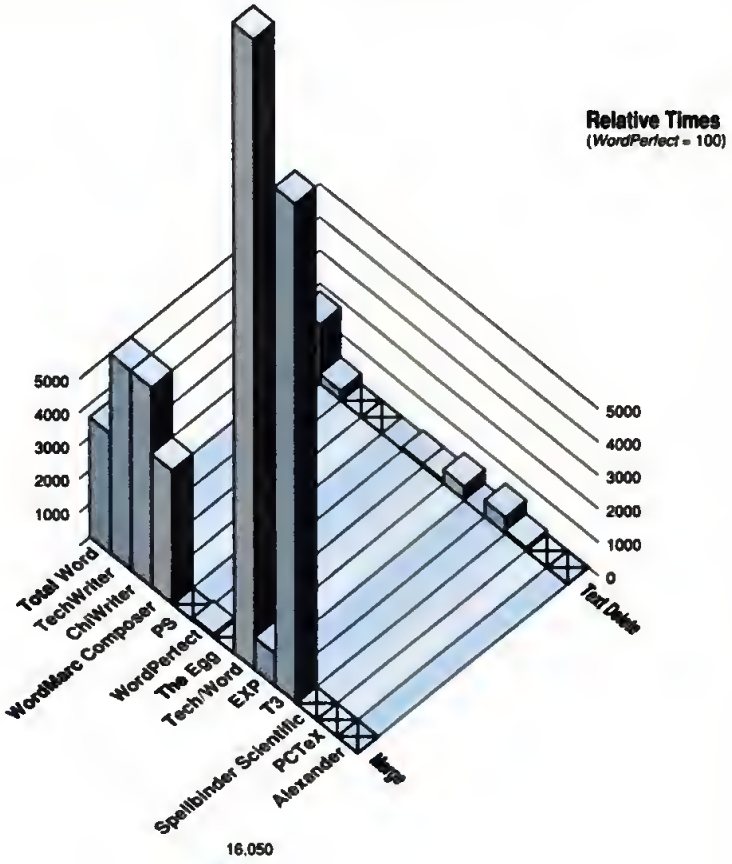
MERGE AND TEXT DELETE

The **Merge** test times the program's ability to import an external file to a point immediately following the middle of the document file. The external file consists of the first three pages of the original document. Again, page formatting affects the performance results.

The **Text Delete** test times how long it takes to define and delete the file that the Merge test imported and inserted into the document. Again, this procedure requires significant page reformatting, and the program's buffering capability greatly affects performance.

Performance Times (Times given in seconds)	Merge	Text Delete
Total Word	3.61	17.66
TechWriter	6.00	3.00
ChiWriter	6.00	N/A
WordMarc Composer	4.00	N/A
PS	N/A	0.10
WordPerfect	0.10	1.00
The Egg	N/A	1.00
Tech/Word	18.93	4.21
EXP	1.00	0.10
T³	15.00	5.00
Spellbinder Scientific	N/A	1.00
PCTeX	N/A	N/A
Alexander	N/A	N/A

N/A—Not applicable, function not available

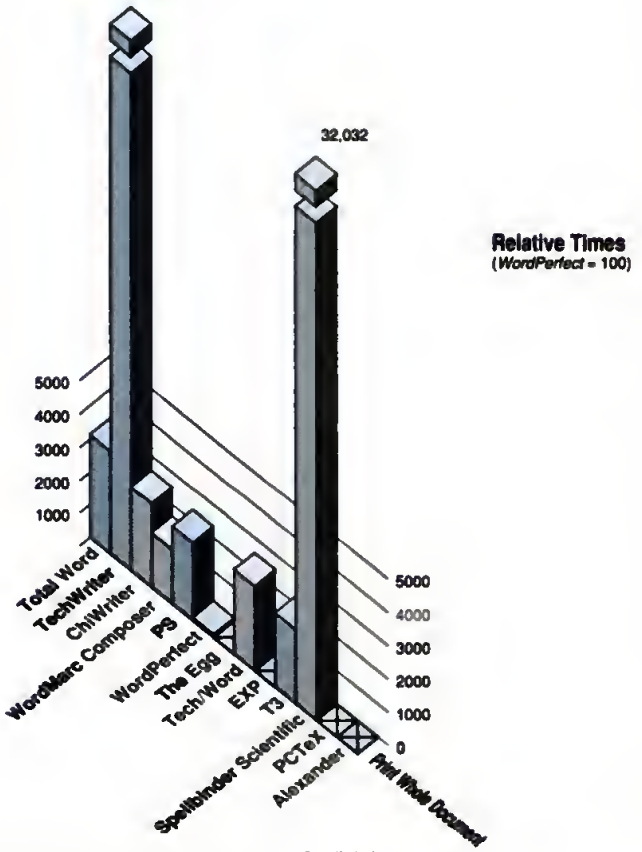


PRINT WHOLE DOCUMENT

The **Print Whole Document** test uses a 1MB RAMdisk and times the program's ability to print the entire 50K test document to an external file.

Performance Times (Times given in seconds)	Print Whole Document
Total Word	62.89
TechWriter	321.00
ChiWriter	51.00
WordMarc Composer	33.00
PS	47.00
WordPerfect	2.00
The Egg	N/A
Tech/Word	50.89
EXP	N/A
T³	45.00
Spellbinder Scientific	640.64
PCTeX	N/A
Alexander	N/A

N/A—Not applicable, function not available



rather hard to memorize.

Overall, *PS* is difficult to master. Nonetheless, it offers exceptional facilities that will make life a lot easier for experienced programmers who need to enter and format technical or scientific text and equations.—**Walt Rowinski**

Spellbinder Scientific

Spellbinder Scientific, Spellbinder Software Products' $790 adaptation of its *Spellbinder* word processor, does an impressive job of handling scientific text. Both *Spellbinder* versions share the same command sequences, function keys, edit-mode features, and command-mode features. Features unique to the scientific version are implemented with function keys and macros.

Spellbinder Scientific lets you freely intersperse and display formulas, equations, and diagrams on-screen with ordinary text. To do so, you'll first type your text as you would any document, and then you'll use function keys to shift to the italic character set for a variable, to boldface for a vector, to math symbols for access to special symbols, and to a miniature character set for subscripts and superscripts.

FONT CAPABILITY *Spellbinder Scientific* offers eight easy-to-use function-key-selected character sets—including ASCII, italic, math symbols, and two sets of

PC MAGAZINE FACT FILE

Spellbinder Scientific, **Version 6.03**
Spellbinder Software Products Inc.
P.O. Box 1950
Davis, CA 95617
(916) 758-3630
List Price: $790

Requires: 256K RAM, two disk drives, DOS 1.0 or later.

In Short: A powerful, easy-to-use scientific word processor with a wealth of features to handle scientific text. It is suitable for scientists and for other users who have modest scientific-document-processing requirements. Not copy protected.

CIRCLE **637** ON READER SERVICE CARD

Back up your software with CopyWrite

CopyWrite backs up hundreds of copy protected software packages for the IBM PC. Where feasible, **CopyWrite** removes copy protection entirely.

CopyWrite now includes **ZeroDisk**, allowing you to run some popular software from a hard disk without anything in your floppy drive. Call for the list of software it handles.

CopyWrite is revised regularly to keep up with the latest in copy protection. Revisions are available for a small charge.

CopyWrite requires an IBM PC, XT, AT, PS/2 or compatible with 256k bytes of memory and at least one diskette drive. It is not copy protected. **CopyWrite** is not for making copies for sale or trade, or for any other use that deprives software authors of payment for their work.

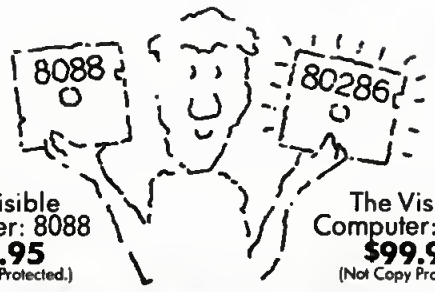
To order, send us a check for $50 US funds, or call with your credit card. We ship within a day. Available on 3 and 5 inch diskettes.

Quaid Software Limited
45 Charles Street East Third Floor Dept 207
Toronto Ontario Canada M4Y 1S2
(416) 961-8243

We've Added a New Teacher to Our Assembly Language Program.

Introducing The Visible Computer: 80286—an advanced version of the "Award Winning" TVC: 8088. Its animated simulation of the PC's microprocessor shows you exactly how assembly language instructions are carried out. And it comes complete with a comprehensive 400 p. manual.

TVC lets you choose from 45 demonstration programs that can be executed with the simulator—from simple register loads to advanced programs that manipulate interrupts and perform file I/O. It makes learning assembly language... elementary!



The Visible Computer: 8088 **$79.95** (Not Copy Protected.)

The Visible Computer: 80286 **$99.95** (Not Copy Protected.)

Software Masters™

The Visible Computer: 8088 for IBM PC/XT/AT and true compatibles; TVC: 80286 for IBM AT. To order direct: Software Masters, 2714 Finfeather, Bryan, TX 77801; (409) 822-9490. Include $3.00 handling. Bank cards accepted.

CIRCLE 487 ON READER SERVICE CARD

For problems involving engineering calculations or scientific analysis, the answer is MathCAD.®

Transporting an iceberg to Southern California is a formidable task. Calculating the variables is just as demanding. How many tugboats would be needed to tow the ice mass? At what cost? How much fresh water would be lost?

Innovative solutions require extraordinary tools. For problems involving calculations or what-if analysis, the answer is MathCAD.

MathCAD is the only PC-based software package specifically designed to give technical professionals the freedom to follow their own scientific intuition.

Requires IBM® PC or compatible

You decide how to solve the problem – MathCAD does the "grunt work."

- Ends programming and debugging.
- Recalculates as variables change.
- Generates quick plots.

Easy to learn and use, MathCAD operates interactively in standard math notation. And its built-in functions provide all the power you need to solve real-world problems. MathCAD handles matrix operations, solves simultaneous equations, works with real and complex numbers, does automatic unit conversion, displays Greek characters and other math symbols, performs FFTs and much more.

There's never been a better way to get fast, accurate solutions to analytical problems. That's why 20,000 engineers and researchers are using MathCAD daily in applications as diverse as fluid mechanics, signal processing and molecular modeling.

To find out what MathCAD can do for you, call us today for a **free demo disk: 1-800-MathCAD** (in MA, 617-577-1017). Or write to MathSoft, Inc., One Kendall Square, Cambridge, MA 02139.

Math Soft
Σ + √ − = × ∫ − δ
Software Tools for Calculating Minds

HOW MANY GLASSES OF WATER

IBM® International Business Machines Corporation MathCAD® MathSoft Inc. © Copyright MathSoft Inc. 1988

CAN THIS ICEBERG SUPPLY TO L.A.?

CIRCLE 154 ON READER SERVICE CARD

TALLGRASS BACKS YOU ALL THE WAY.

Tallgrass makes internal and external tape backup systems for the IBM PC/XT/AT, PS/2 or compatibles, and an external unit for your Mac Plus, SE or II.

We've got a whole new family of tape backup systems.

Whether you've got an IBM, a compatible, or a Macintosh, you can count on Tallgrass. We back you with all the storage capacity you could ask for, plus all the features, all the support, and all the speed you'll ever need. And we make it easy to protect your valuable data. Since all operations are automatic and unattended, you can just set it, and forget it.

Best of all, we stand behind our products with the industry's only 3-year warranty.

But there's one other reason why so many more people are asking for Tallgrass. It's because the competition is asking so much more for their products.

Let Tallgrass start backing you up. Call 1-800-TAL-GRAS. Or write to:

Tallgrass Technologies, Inc.
11100 West 82nd St.
Overland Park, KS 66214

TALLGRASS TECHNOLOGIES

When it's worth saving, it's worth Tallgrass

1989 Tallgrass Technologies Inc. IBM is a registered trademark of International Business Machines, Inc. Macintosh and Mac Plus are trademarks of Apple Computer Inc.

CIRCLE 233 ON READER SERVICE CARD

chemical symbols. (ASCII, italic, and math symbol character sets may be miniaturized.) Except for a few of the math symbols, these characters may be used as super- and subscripts or may be centered.

Among the characters that compose the math symbols character set are Greek letters and logical and mathematical operators. Several diacritical marks and enhanced character forms are also included, and the keyboard diagrams included with the package map the key combinations for math and chemical symbols.

One timesaving feature is *Spellbinder Scientific*'s math edit macro, which simplifies the entry and editing of a mathematical diagram. Several functions identify the top-left and bottom-right opposite ends of an area as a "function box." The macro creates fixed-shape symbols in the appropriate size for the function box, which can be moved, copied, or centered. The macro facilitates the insertion, deletion, replacement, centering, and aligning of text in one term without destroying the alignment of other terms in the diagram. The program also offers a chemical edit macro for formula diagram editing that is similar to the math edit macro. These powerful edit macros make the program a good choice as a secondary word processor for patent attorneys.

CHARACTER EDITOR A character editor lets you alter the appearance of characters; using this feature you can create a new application-specific character set. If you wanted to supplement *Spellbinder Scientific*'s math and chemical symbols with those needed for electronics diagrams, for example, you would be letting yourself in for an extensive undertaking. But developing half a dozen new symbols is a realistic goal.

What *Spellbinder Scientific* displays on-screen is what it will print; with exceptions in certain enhancement modes, the program doesn't force you to vsiualize how strange on-screen command sequences will print out.

With its powerful edit macros, diacritical marks, a character editor, and eight character sets, *Spellbinder Scientific* is a good partner for anyone who needs to produce high-quality scientific documents.
—Kenneth H. Werner

dBFast™ -vs- Clipper™

New! dBase III Plus Compiler

Faster! **dBFast™** compiles and delivers a typical .EXE file in under 5 seconds, while Clipper is still plodding through a 4 minute compile/linking routine. And check out our blistering execution speed . . . . We blow away the competition! "Why wait?"

Smaller! With Clipper's lumbering "overhead," the smallest possible execute file is 120KB . . . and it mushrooms from there! **dBFast**'s ultra-efficient "runtime engine" results in amazingly compact code, as small as 1KB!

Smarter! **dBFast** delivers very high dBase III compatibility. It supports dBase .NDX files and is LAN-capable right out of the box. It's many features include AUTOLOCK, SOFTSEEK, APPEND, BROWSE, CHANGE, EDIT, and **dBFast** supports external PROCEDURE FILES.

Cheaper! At a fraction of the cost of the competition, **dBFast** sets the new industry standard for Price-To-Performance. For developers, distribution rights are **Royalty-Free**. And, as an added bonus, dBFast now includes dBEdit, a professional-grade text editor. "Why pay more?"

The new kid on the block!

Operation	dBFast	Clipper
Minimum .EXE file size	1kb	120kb
Compiling/Linking	5 Seconds	4 Minutes
Execution Time	10 Seconds	51 Seconds
PRICE	$99	$695

- Now Includes Professional-Grade Text Editor
- Fastest Compilation
- Smallest .EXE's
- Fastest Execution
- LAN-Compatible
- Highest dBase Compatibility

Available through Egghead Discount Software.

60 day Guarantee.

Try **dBFast** for 60 days. If you're not totally satisfied for any reason, just send it back for a full refund (less $10 handling fee).

Call today! 1-800-356-6356

Sales information call 1-206-392-0368. Dealer inquiries welcome.

Name _____ Company _____ Address _____ City _____ St. ____ Zip ____ Phone # _____

Payment (circle one): VISA MC AMX Check

Card # _____ Expires _____ Name on Card _____

	Qty	Subtotal
dBFast	____ @ $99	
Shipping. $4 U.S., $25 outside U.S. (add $4 for each add'l package)		
WA residents add 8.1% sales tax		
Total (U.S. funds only)		

VISA MasterCard

dBFast is a trademark of dBFast Inc.
dBase III Plus and Clipper are registered trademarks of Ashton Tate Corp. and Nantucket Corp. Respectively © dBFast Inc.

1420 Gilman Blvd.
Suite 2057
Issaquah, WA 98027-5399

CIRCLE 148 ON READER SERVICE CARD

T^3

T^3 (pronounced "tee cubed") is *big*. If you can give it 3MB of disk space and your full 640K of RAM, T^3 can do big things for you. Built-in fonts support scientific, mathematical, and chemical word-processing, Greek and Russian alphabets, and more. If you need symbols not already included in the fonts, you can create your own with the font editor.

If you're familiar with word processing conventions, you may have some unlearning to do before you can use this $595 program from TCI Software Research. Its authors clearly decided to eliminate all assumptions and design the program from the ground up. For example, you can never start a new file in T^3—you must always revise a copy of an existing document. Fortunately, it's easy to create shell documents that contain all the appropriate formatting commands for a business letter or a chemistry text. The program comes with quite a few of these shell documents.

All T^3 files reside in volumes, and each volume is a single DOS file. Within a volume, document names can be up to 16 characters long, and no characters are forbidden. However, you won't be able to manipulate your files with standard DOS utilities.

EDITOR'S CHOICE

PC MAGAZINE FACT FILE

T^3
TCI Software Research Inc.
1190-B Foster Rd.
Las Cruces, NM 88001
(800) 874-2383
(505) 522-4600
List Price: $595

Requires: 640K RAM, hard disk drive, graphics monitor, graphics printer, DOS 2.0 or later.

In Short: This massive program should handle any scientific, mathematical, or chemical word-processing job. Not copy protected (U.S. version).

CIRCLE 632 ON READER SERVICE CARD

DEVELOPING HABITS ANEW Your keyboard habits will have to change, too, for T^3 makes extensive use of *chording*. In effect, chording allows any key to act as a Shift key. For example, the "Center" key (5 on the numeric keypad) serves as a "repeat shift." If you press and hold a cursor key, it moves just one space, but if you press Center as well, the cursor moves continuously.

The cursor keys themselves can begin chords. Hold down the Cursor Right key and tap any letter key—the cursor moves right, to the next occurrence of that letter. If you press the Del and move the cursor, the text is highlighted from the point where

SHARING SOLUTIONS

MASTER SWITCH

• 2, 3, 5 or 8 ports
• Any port to any port
• Up to 1 megabyte
• Serial, parallel or both
• From $350

This very smart switch connects several computers to several peripherals such as printers, modems or host computers. A code sent to the unit selects the destination. All ports can communicate to any other port concurrently. Features include configuration menu, form feed, initialization strings, priority status, cancel, timeout disable, front panel display, and many more.

Caretaker Plus AUTOMATIC SWITCH

This is printer sharing at its best. All computers can send data simultaneously. The data is released to the printer in the order it was received. Auto form feed and setup strings keep printer jobs separated. From the front panel you can clear any port. Operation is fully automatic. No changes to your software are required.

• 4 or 8 computers to one printer
• Up to 256K memory
• Serial or parallel
• From $395

PORTER CODE ACTIVATED SWITCH

The PORTER is a versatile unit for port expansion. It is used widely for data collection, telecommunications, factory automation and multiple printer control. Data can be received and transmitted simultaneously on all ports and is routed by command. Other commands include wait, go, copy, and clear buffer. It is often used on an add on to a local area network.

• One computer to 8 or 8 peripherals
• Up to 256K memory
• Serial or parallel
• From $295

Additional Interface Products

• Printer buffers
• Manual switches
• Protocol converters
• Cables and adapters
• Modems/line drivers
• Multiplexers

• One year warranty
• Full technical support
• 30 day money back guarantee
• OEM and custom configurations
• Call us for all your interface needs

ROSE ELECTRONICS
P.O. BOX 742571
HOUSTON, TX 77274
CALL FOR CATALOG
713 933 7673

Rose Electronics is a recognized Houston based manufacturer of computer peripherals and data communication products. Our customers include the Fortune 500, the federal government, and schools and universities. Some of the applications suited to our products are printer sharing, computer networking, desktop publishing and micro to mainframe communication.

Dealer inquiries are welcome.

CIRCLE 290 ON READER SERVICE CARD

Compact Disk Products, Inc.

CD-ROM/WORM

ALL PRODUCTS, LOWEST PRICES, EXPERT ADVICE

INTRODUCTORY OFFERS

Hitachi 1503S or 3500S CD-ROM Drive with your choice of:
- McGraw Hill Science and Technical Reference Set $895
- Grolier Electronic Encyclopedia $895
- Microsoft Bookshelf $895
- PCSIG Library (Disks #1 through #1000) $895
- Geovision U.S. Atlas and Mapmaker $1395
- The Bible Library $1195

CD-ROM SOFTWARE

Grolier or McGraw Hill or Bookshelf or PCSIG $269
The Bible Library $425
Kirk-Othmer Encyclopedia of Chemical Technology $845
Registry of Mass Spectral Data $2655
Geovision U.S. Atlas and Mapmaker $795

TOLL FREE ORDER LINE · 800-MEGABYTe (634-2298)

CD-ROM and WORM DRIVES

Hitachi 1503S External CD-ROM Drive with Audio $729
1503S with Digital Audio Output $1229
Hitachi 3500S Internal 1/2 Height CD-ROM Drive w/Audio . . $719
Maxtor 800 MB WORM Drive $3799
Optotech Laserbank 400 MB WORM Drive $2799
Portable 286 with CD-ROM Drive $3795

CD-Capture ($149) Capture Digital Audio Information from any CD to RAM or Disk. Also allows playback of music from RAM.
CD-Play ($89) Pop-up utility that permits user to play all audio CDs on Hitachi and compatible drives. Output to headphones or amplifier.
CD-Play-Sampler ($149) Same features as CD-Play plus the ability to name two points on an audio CD and loop between them.
CD-AudioFile ($149) Automatically creates database records of all your audio CDs. Allows you to store a preferred play sequence for each disk. Automatic recognition of CDs. Creates DBase compatible records.

CDP
217 E. 85th St.
Suite 216
New York, NY 10028
Tel. 212-996-6999
Fax 212-439-9109
Compuserve 75530,214

Free 3 Month Subscription to CD-ROM Review with orders over $300

INTERNATIONAL ORDERS A SPECIALTY
Australian Agent: XEWTEL
145 Cotham Rd.
Kew, Victoria 3101
Tel. (03) 817-5933

CIRCLE 261 ON READER SERVICE CARD

For the IBM® PC, XT, AT, PS/2 and compatibles. Supports most printers including LaserJets.
ONLY $49.00. Available through dealers, or direct from Paul Mace Software Inc., 400 Williamson Way, Ashland, OR 97520.
To order: (800) 523-0258 (VISA, MasterCard, C.O.D.). © 1988 Paul Mace Software.
CIRCLE 211 ON READER SERVICE CARD

you pressed Delete to where the cursor resides. Release it and that text is deleted. While this technique takes some getting used to, it makes the keyboard substantially more flexible.

T^3 uses horizontal-moving-bar menus. They scroll up and down, and you can shortcut them by typing the first letter of the selection you want. Almost any operation in T^3 involves at least one menu. If you need to fill in a blank (for example, a filename, a font, or a keyboard definition), hit the Menu key for a dynamically built list of choices.

MENUS AND MACROS There are so many menus that an experienced user might feel slowed down were it not for the macros. You can create an unlimited number of named macros in T^3. To invoke a macro, hold down Ctrl and type in the name. A T^3 macro doesn't do any conditional branching; it's strictly a recorded sequence of keystrokes. But one macro can call another, and you can edit your macros with a T^3 utility.

For all its flexibility in terms of prepared and user-created fonts, T^3 *does* have some limitations. Delimiters such as brackets have no "stretch"—you build them from smaller pieces, and you must add pieces if your equation grows vertically. Also, the screen display for T^3 is not quite the same as its output. There's no proportional spacing or justification on-screen; all characters line up on columns and half-rows. Fonts don't show on-screen exactly as they will print. Apparently, managing full graphics would have slowed down the program too much.

■ T^3's authors clearly decided to eliminate all assumptions and design from the ground up.

Besides handling your technical work, T^3 has the features typically found in professional word processors that let you create business documents. Business letters printed on a laser printer in a proportional font look very good, and Trigram's *Resident MicroSpell* will make sure they're spelled correctly. TCI also provides "hooks" for Borland's *Turbo Lightning* if you have it.

Don't expect to create complex documents the first day you use T^3. There's a lot to learn, even with help from the supplied Tyro Tutorial. T^3 is immense and very powerful. Its screen display is not 100 percent WYSIWYG, but it's definitely close enough for good work. If you need to work

Travel Companions.

The WorldPort 2400™ and the WorldPort 1200™ modems are the perfect travel companions for your portable computer. They work virtually anywhere in the world, including hotel rooms and phone booths, allowing you to connect in a few million more locations than other modems.

With features superior to internal units, the WorldPort line of modems is the smart choice for all your communication needs. WorldPort modems operate from their own internal battery, drawing no power from your laptop. Cutting edge technology brings you features such as Bell and CCITT standards, direct connect and acoustic interface (300 and 1200 bps), tiny size and a tiny price. The WorldPort 1200™ can be easily upgraded to 2400 bps and both the WorldPort 2400™ and the upgrade come with Carbon Copy PLUS™ communications software.

Find out more about the travel companions that won't tie down your portable computer.

Call us today for more information about the WorldPort line of modems, or the name of your nearest dealer, at **800-541-0345**. (In New York, 516-261-0423.)

Touchbase Systems, Inc.
160 Laurel Avenue
Northport, NY 11768
(516) 261-0423
TELEX: 6502848020
FAX: (516) 754-3491

WorldPort 1200 and WorldPort 2400 are trademarks of Touchbase Systems, Inc., Carbon Copy PLUS is a trademark of Meridian Technology Inc.

CIRCLE 231 ON READER SERVICE CARD

Why build a printer you can stand on, when all it will ever carry is a full office workload?

The answer is reliability.

We built the best track record in the industry by demanding a lot more from our products than you ever will. OKIDATA engineers call this "championship specs." Over 3 million OKIDATA users call it rugged reliability. And it shows in the quality and performance of every printer and modem we make.

You can see it in our new 300 series of 9-pin and 24-pin printers. Their speed, print quality and sheer versatility can carry a ton of paperwork. With day in, day out reliability. OKIDATA wouldn't have it any other way. Why should you?

Call 1-800-OKIDATA for the dealer near you.

CIRCLE 235 ON READER SERVICE CARD

OKIDATA®

an OKI AMERICA company

We put business on paper.

OKIDATA is a registered trademark of Oki America, Inc.,
Marque déposée de Oki America, Inc.

on technical documents all day long, *T*³ would be a sensible choice.
—Neil J. Rubenking

Tech/Word

With *Tech/Word*, Goldstein Software offers a simple and inexpensive solution to the difficult task of including scientific and mathematical text within a document. The $75 program includes a total of seven special fonts, a normal text font, and the ability to create custom fonts. These built-in fonts, coupled with the program's built-in math structures and symbols, allow you to compose documents in the language of math.

You create a complex equation by keystroking in a series of graphics characters. *Tech/Word*'s mathematical/science expressions are fully WYSIWYG, which spares equation writers the agony of waiting to see hard copy to judge the integrity of an equation. For its low price, even if *Tech/Word* did nothing else but let you type math/science expressions, it would be a useful program.

Tech/Word does considerably more, but not nearly as much as do other scientific-technical word processors on the market. That's because it places a heavier emphasis on the *Tech* component of its name than on the *Word* component. So, while you can create relatively complex formulas and equations, you cannot manage complex documents requiring specific numbering or outlining schemes. It is difficult to size text and equations, and there are no provisions for managing indexes, title pages, tables of contents, tabular materials, or footnotes, all of which are typical requirements of scientific writing.

You cannot easily create multiple margins in a document. There is no drop to DOS, nor is there a way to save the current file with a new filename, resume editing

PC MAGAZINE FACT FILE

Tech/Word, Version 1.09F
Goldstein Software Inc.
12520 Prosperity Dr.
Silver Springs, MD 20904
(301) 622-9020
List Price: $75

Requires: 320K RAM; two disk drives; CGA, EGA, or Hercules graphics card; DOS 2.0 or later.

In Short: This program is an easy-to-use, effective word processor capable of producing a wide variety of scientific and mathematical equations in a painless WYSIWYG fashion. *Tech/Word*'s word processing features are not particularly well suited for managing large documents, but the program may be a terrific solution for short scientific-technical documents. Not copy protected.

CIRCLE 636 ON READER SERVICE CARD

*PS/2 COMPATIBLE

Simply The Fastest In The World!

PC FullBak is the FASTEST!
The accompanying screen tells the whole story! It's not sensitive to your CPU speed. Run it on an IBM PC, XT, AT, or PS/2 30, 50, 80 or true hardware compatible at 8, 12, 16—even 20 mhz.

PC-FullBak is SIMPLE!
Use the light-bar menu interface or choose to issue your orders from the command line or batch file.

PC-FullBak is THOROUGH!
PC-FullBak allows you to back up, compare, or restore an entire hard drive with or without sub-directories, a single sub-directory, or an individual file. You may even append new files to the end of your backup set.

PC-FullBak is INEXPENSIVE!
From the people who gave you *PathMinder* and *SafetyNet* you would expect value. How does $59.95* strike your pocketbook?

PC-FullBak passes the TESTS
"PC Week tests disclosed that PC-FullBak is 12% faster than Fastback. PC-FullBak is heartily recommended."—PC Week

"PC-FullBak is the least expensive program. I judged it the easiest to use."
—M. Bryan, LOTUS Magazine

At your dealer now or order direct. Volume purchases & site licensing available.

3.6 MEG PER MINUTE! †
(† ON INTEL 80386 16 MHz)

$59.95
*+$5.00 S&H

WESTLAKE DATA
(512) 328-1041/P.O. BOX 1711/AUSTIN, TX 78767

*PS/2 is a trademark of IBM

CIRCLE 485 ON READER SERVICE CARD

Now that the best name in CAD is this affordable, why settle for a generic brand?

What's in a name? When it comes to the Autodesk name, a lot. In fact, it's the best-selling, most well-respected name in the CAD business. There simply is not another company with the credentials to make that claim.

That's why you shouldn't settle for anything less than AutoSketch,® the best way to get started in CAD. AutoSketch is the precision drawing tool from the Autodesk family of products. Not only is AutoSketch priced at just $79.95,* but unlike some entry-level CAD products, you don't have to keep spending more to add the features AutoSketch already has. Standard features like boxes, circles, stretching, mirroring and rotating—to mathematical precision. And advanced CAD capabilities like dynamic PAN and ZOOM and automatic dimensioning and scaling, in up to 10 working layers.

Of course, if you do want to move up from AutoSketch at some point, your files can easily be uploaded into AutoCAD.®

AutoSketch runs on IBM® PC/XT™/AT®and 100% compatible computers, and supports IBM's PS/2.™

So if you're ready for CAD, why not go with the name that rates highest among both critics and users? Anything else is, well, second-rate.

To order your AutoSketch directly, call 1-800-223-2521. For the name of your nearest AutoSketch Dealer or for more information, call 1-800-445-5415 or write to AutoSketch, 2320 Marinship Way, Sausalito, CA 94965.

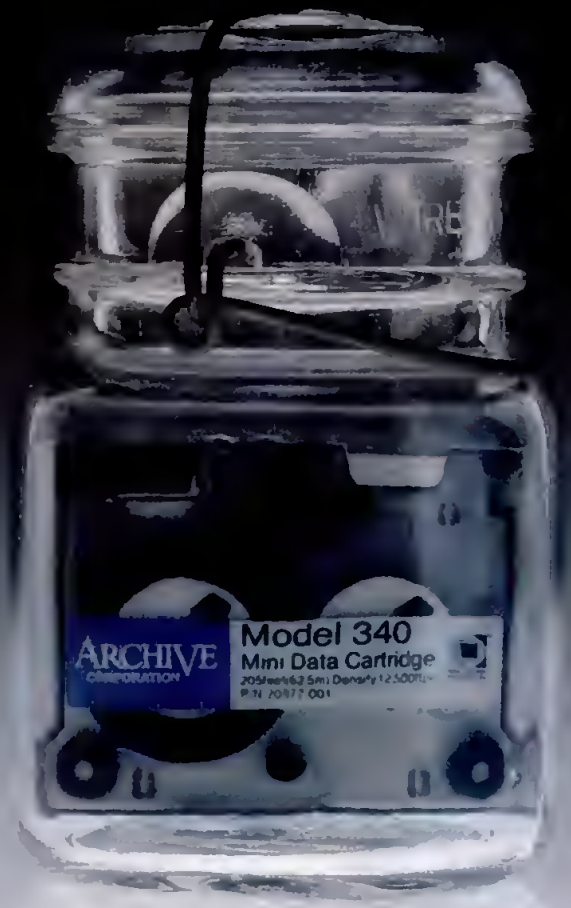
AUTODESK, INC.

CIRCLE 165 ON READER SERVICE CARD

*A speed-enhanced version (9 times faster), requiring a math coprocessor, is available for $99.95.

AutoSketch and AutoCAD are registered in the U.S. Patent and Trademark Office by Autodesk, Inc. IBM and Personal Computer AT are registered trademarks of International Business Machines Corporation. Personal Computer XT and PS/2 are trademarks of International Business Machines Corporation.

20MByte XL
now just $329.
Suggested retail price



Preserve the fruits of your labor.

You have valuable information on your computer system that demands protection—client lists, sales records, inventory lists, legal contracts, financial records.

Archive Your Data.

Preserve your vital data by creating your own personal archive. The Archive tape backup system is your solution.

The Archive Streaming Tape Solution.

Archive streaming tape systems are easy to add-on and are fully compatible with your IBM PC, XT, AT and compatibles. And all models of the IBM PS/2 family. Both 3½ and 5¼-inch form factor products can be installed directly in your computer cabinet. Or simply connect our free-standing, self-contained external unit.

Software Completes the Solution!

Archive can preserve 10, 20, 40 MB and more of your data in minutes. Thanks to Archive's own menu driven, auto-prompting QICstream software.

And with over 1 million drives shipped, our leadership position is unequaled in the industry. Archive provides you with the lowest cost—most reliable—advanced technological products on the market today!

Preserve the fruits of your labor. Call now: 1-800-237-4929 for the Archive dealer nearest you. And tell them you want the **Archive Streaming Tape Solution.**

CIRCLE 527 ON READER SERVICE CARD

ARCHIVE®
CORPORATION

© 1988 Archive Corporation. Archive is a registered trademark of Archive Corporation. QICstream is a trademark of Archive Corporation. IBM and IBM Personal System/2 are trademarks of International Business Machines.

after a save, create columns, or center paragraphs of text. There's no spelling checker, no thesaurus, no control of backups or a file save procedure, and only a rudimentary search-and-replace facility. Items such as page breaks, page numbering, line spacing, and footers and headers are not WYSIWYG.

Yet, despite these limitations, what exists works well and easily. With the quick reference card and brief tutorial, I was using the program to full capacity after only 30 minutes. However, since the more-complex Alt-, Ctrl-, and Shift-key commands form the bulk of the *Tech/Word* program, since there is no context-sensitive help, and since using the fonts requires mapping the keyboard to other symbols, I usually found myself needing to keep an open manual by my side even after spending days with the program.

■ With the program's quick reference card and brief tutorial, *Tech/Word* can be used at full capacity after only 30 minutes.

When you install the program, you can choose all or some of the built-in fonts. These can be modified and assigned to documents on an individual basis. The main menu is function-key driven and allows you to either edit or print a file or perform some DOS file-management functions.

SIGNS OF AGE The program shows its age when you choose to edit or print a file. It displays an unsorted list of available files. You must type rather than point-and-select the file you wish to edit. Each time you choose a file, you must tell *Tech/Word* to accept or modify your selected default fonts.

Choose edit, and you are brought to a roomy editing screen with a single status line and a ruler line. Alt-Key commands are used to produce different text formats, many of which are displayed in WYSIWYG style on-screen. A series of Ctrl-B commands handles block cut, paste, copy, and save functions. A series of Ctrl-D commands offers a respectable variety of delete-text options, including the deletion of math structures and expressions.

AMPLE TOOLS FOR EQUATIONS Creating equations using *Tech/Word* is a sensible procedure, and you are given ample tools. The function keys define the math structures. Structures describe the look of an intended multiline-height equation. So, for example, you can choose a triple-level I-shaped structure to enter a summation or a triple-level C-shaped structure for integrals. The program also makes it easy to include square roots, radicals, fractions, and matrices within text.

Tech/Word offers eight different math enclosures, including thin and thick brackets, braces, and borders. As you enter information in the bracketed areas, they widen to accommodate these characters. Multiline-height math functions, such as the integral, pi, and sigma symbols and arrows, are also available and are sized to your specifications with a single command.

Combining keyboard commands and special fonts creates the math expression. For a typical equation, you might need a bracket, a "triple double-level super" formation, and keyboard associations entered from any of the three built-in math fonts, a Greek font, two IBM graphics fonts, a script font, a normal font, or a custom-designed font. Two additional fonts for chemical symbols are available free of charge but are not included with the program package.

Creating expressions in this pick-and-choose manner is easy, but there are certain drawbacks. First, these clumps of graphics information can be difficult to edit. As I attempted to edit fractions or move a nested bracket, I often opted to begin from scratch. Second, this graphics building-block approach requires that you must always have the manual or the appropriate help screen displayed. Few users will be able to memorize the keyboard as-

THE HEAT IS ON!
AT PRINTERS PLUS
Printers Plus has been satisfying customers since 1982 by exclusively concentrating on computer printers. We're not just order takers - we're experts! Call today!
IT'S TIME YOU SAW THE
ALPS
ALQ 224e

FEATURES:
• 24 pin print head
• Full color dot matrix printer
• Hi-res graphics
• Tractor included!
• Paper Park
• Epson emulation
• IBM extended character set
• 240 cps draft/80 cps letter quality
• Easy front panel control
LIST PRICE $875
CALL FOR PRINTERS PLUS PRICE
THE WORLD'S LARGEST SELECTION OF PRINTERS!
We guarantee to match the lowest in-stock prices in this issue of PC MAGAZINE! If you don't see it, CALL!
PRINTERS
ALPS BROTHER CITIZEN EPSON
FUJITSU NEC NLQ* OKIDATA
OLYMPIA PANASONIC PRINTRONIX TOSHIBA
WE'RE LASER EXPERTS
APPLE AST BROTHER CANON EPSON GENERAL COMPUTING
HEWLETT-PACKARD KYOCERA NEC OASYS OKIDATA
PANASONIC PRINTERS PLUS OMS OLIVETTI TOSHIBA XEROX
GREAT PRICES WITH A GUARANTEE TO MATCH *
PRINTERS PLUS
THE NATION'S ONLY COMPUTER PRINTER SPECIALISTS

FAX NUMBER: (703) 734-3859
PRINTERS PLUS, INC.
8486-C TYCO RD., VIENNA, VA 22180
HOURS: MON-THUR: 10 AM-7 PM EST
FRIDAY: 10 AM-5 PM
(703) 734-0236
WE'LL CREDIT COST OF LONG DISTANCE TELEPHONE CALL WITH ANY PRINTER PURCHASE.
This offer good only through mail order division
Visit our 7 retail showrooms for best local prices
15% restocking fee applies to all returned or refused merchandise
PRINTERS PLUS AND COMPUTER PAPER DESIGN ARE REGISTERED TRADEMARKS OF PRINTERS PLUS, INC., VIENNA, VA.
CIRCLE 293 ON READER SERVICE CARD

WORD MOVER™

All These Functions For $150.00

Word processing
Document tracking
Communications
Terminal emulation

4 functions in one easy to use program that conserves your learning time, your PC's memory, and your money. Wordmover's state of the art features are based on Computerease Software's experience with the publishing industry since 1983.

Powerful Word Processing
written in assembly language for speed, menus for beginners, command interface for advanced users, built in spell checker, edit up to 9 files at a time, 20 level undelete, search and replace, proportional font support, macro/script capability, mail merge.

Integrated Communications
dialing directory, translation tables, XMODEM, unattended file receive, customizable terminal emulation for VT100, 3101 etc.

Document Tracking
Wordmover gives you the cross referencing of a database without the setup and learning hassles. Customizable "header" templates for tracking by addressee, subject, document number, etc. Selective directories by category of file.

Easy to use
Tutorial documentation keyed to progressive help screens for quick incremental learning. Pop down menus and key prompts. Customizable keyboard, commands, messages, & color.

COMPUTEREASE SOFTWARE

P.O. Box 170
Warren, R.I. 02885
(401) 245•1537 (401) 245•1523
CIRCLE 130 ON READER SERVICE CARD

sociations for all these special symbols. Third, many scientists prefer an English-language "Keyword" approach to processing math expressions because it is less intrusive. The flip side of this is that non-equation-speaking secretarial help seems to prefer the more graphics symbol-oriented solution.

Tech/Word is the offspring of *GoldWord*, which is also an easy-to-use but limited word processor. In fact, it looks as if *Tech/Word*'s scientific and math production capabilities were tacked onto the *GoldWord* processor. Any tailor will tell you that tacking the new onto the old invariably leaves a few seams showing. *Tech/Word* does an admirable job on equations, but it just squeaks by on text processing.—**Robin Raskin**

TechWriter

TechWriter, a $395 technical word processor from CMI Software, is reliable and relatively straightforward to use, even with its few idiosyncrasies. Although it won't do your calculations for you, the package offers a flexible and simple method for producing documents that contain equations—both mathematical and chemical—and it also has a large variety of commands.

Besides the standard ASCII character set, *TechWriter* supports three additional fonts. These fonts include the complete Greek alphabet, as well as an assortment of mathematical, scientific, chemical, text-marking, and script characters.

Among its array of commands, the program uses function-key combinations, Shift/Alt/Ctrl-key combinations, as well as Alt-number combinations. Command sequences often consist of several logical steps. For example, you define a block of text by using the begin block and end block commands. You can then move the block of text with the move block command and clear it with the clear block command.

The template that is included with the package is a vital guide to *TechWriter*'s commands and special symbols. In case you forget how to select an alternate font, a hint on the template instructs you to type the standard character on the alphanumeric keyboard and then press F6 to toggle through the four options for that key. All of *TechWriter*'s 270 special symbols are a single character in height and are clearly displayed on the screen in WYSIWYG format.

EQUATIONS FROM SCRATCH To format an equation that takes up more than one line or that includes an oversized character, you use a special equation block that adjusts the line spacing for oversized characters and protects the equation from being interrupted by a page break. Once you go through a few preliminary steps to define a block, *TechWriter* goes into Math mode, in which you simply enter your equation as it is to appear in print. What you see on the screen is what you'll get on paper. However, it is impossible to see a double bond on a chemical symbol on the screen: this symbol looks the same as a single bond.

One helpful feature is *TechWriter*'s library of glossary, or macro, commands, activated in Math mode, that lets you draw commonly used oversized characters. Among the 20 glossary entries are the integral, radical, and summation signs; large brackets, braces, and parentheses; pi, 60- and 30-degree lines; and the carbon ring.

Once you've made your selection by pressing the Gloss key and typing a one- or two-character specifier, *TechWriter* will ask you to define the character's dimensions. You can then accept the default or specify the appropriate number of lines and columns. The package also allows you to draw carbon rings, convert a single bond to a double bond or vice versa, and *Tech-*

PC MAGAZINE FACT FILE

TechWriter
CMI

TechWriter,
Version 3.0
CMI Software
621 Main St., #7A
Waltham, MA 01254
(617) 899-7244
List Price: $395
Requires: 256K RAM, two disk drives, DOS 2.0 or later.
In Short: This is a versatile word processor with many symbols that can be used for writing equations or chemical formulas. It has an extensive command set and supports three alternative fonts. Not copy protected.

CIRCLE 635 ON READER SERVICE CARD

SPEED UP WITH...

FLASH 5.6

NOT JUST ANY CACHE!

PC MAGAZINE EDITOR'S CHOICE

"A feature-rich caching program with adjustable cache sizes and support for extended memory. Still the best caching software for your money. Not copy protected."
PC Magazine Nov. 24, 1987

FLASH

This rock solid supercharged package accelerates all your disk accesses, increases your cursor speed and prolongs the life of your hard disk.

FLASH speeds up data-basing, word-processing, desk-top publishing, CAD-designing and accounting software by as much as 300% or more. Even 386 machines are not at full speed until they use FLASH. It boosts your performance tremendously.

FLASH ONLY $69.95

FLASH FEATURES

- ▶ Speeds up disk accesses ◀
- ▶ Uses EMS expanded memory ◀
- ▶ Uses AT extended memory ◀
- ▶ Uses any nonstandard memory boards ◀
- ▶ Uses EMS & AT memory together ◀
- ▶ Accesses up to 3 MEGS of RAM ◀
- ▶ Buffers 26 Device Driven Drives ◀
- ▶ Dynamic track reads ◀
- ▶ Can glue files into buffer ◀
- ▶ Speeds up cursor ◀

FREE UTILITIES

FLASH RAM-DISK is a Dynamically allocating RAM-DISK which shares memory with FLASH. When not in use, memory is not borrowed from FLASH. This maximizes memory utilization.

FLASH KEYS speeds up your cursor for word-processing and spreadsheet programs. Scrolling and editing become a breeze instead of a chore. You no longer have to wait for the cursor. YOU choose the cursor speed. Selecting rates up to 6 times faster than that of a normal cursor.

INTRODUCING

Savior

SAVIOR makes the seemingly impossible, possible! It raises files from the dead!!

This miraculous package, by automatically "undeleting" files, takes all the worry out of accidental deletes, and saves. No matter how fragmented your file has become, SAVIOR returns the original file intact.

SAVIOR also possesses the ability to retrieve previous file versions. It can even revive files "lost" after storing other information on top of them.

NO OTHER PROGRAM ON THE MARKET WILL DO ALL OF THIS AND ONLY USE 5K OF RAM!

Every PC owner owes it to their PC to invest in SAVIOR

SAVIOR $89.95
FOR FLASH OWNERS ONLY $69.95

SPOOL-MASTER

SPOOL-MASTER offers all of the features of standard printer-spoolers plus much more. It functions as an extension to your printer's buffer. Thus allowing your program to continue processing while the printer prints.

FEATURES

- ▶ Redirect printer output to files ◀
- ▶ Uses AT extended memory or EMS expanded memory if FLASH is installed ◀
- ▶ Controls page eject (form feed) from keyboard ◀
- ▶ Spooler easily controlled by simple keyboard sequences ◀
- ▶ User selectable buffer size ◀

Only 8K of RAM is needed to put SPOOL-MASTER to work.

SPOOL-MASTER $69.95
FOR FLASH OWNERS ONLY $49.95

BACKTODOS

BACK-TO-DOS offers you the ability to make ANY program a pop-up program, regardless of size. BTD offers all this flexibility while only using 15K of your precious RAM.

FEATURES

- ▶ Make any program a pop-up utility ◀
- ▶ Uninstall unwanted TSR's in a single keystroke ◀
- ▶ Reinstall the same TSR's back with a single keystroke ◀
- ▶ Only 15K of RAM is needed ◀
- ▶ Even makes PC-DOS a pop-up utility ◀

BACK-TO-DOS
THE POP-UP MANAGER

BACK-TO-DOS $69.95
FOR FLASH OWNERS ONLY $59.95

For more information call (317) 253-8088

To place an order call (800) 25-FLASH

We accept MasterCard, VISA, COD & Check. Please add $4.00 for shipping & handling in the USA, $6.00 for Canada, $15.00 for overseas deliveries.

SOFTWARE MASTERS

Software Masters
6352 N. Guilford Ave.
Indpls. IN 46220

CIRCLE 488 ON READER SERVICE CARD

Software Excitement's
User-Supported Collection

TOP 40 DISKS

For IBM PCs and Compatibles

$2.75 Ten or More OR $3.25 Small Quantities

FREE Same-Day Shipping
(orders of 5+)
Your Satisfaction Guaranteed!

BUSINESS/ACCOUNTING/FINANCE/DBASE

- ☐ **Personal Finance Manager**—Menu-driven savings, check, and investment tracker
- ☐ **E-Z Forms**—Make generating any type of business form easy
- ☐ **Portsworth Package**—Monitors and evaluates your investment portfolio
- ☐ **Easy Payroll System**—All the features you need—even on-screen help
- [2] **Mr. Bill**—A complete and evolved billing system for your business (2 disks)
- ☐ **Stock Charting System**—Creates high/low/close, moving average, and other charts
- ☐ **Finance Manager II**—A powerful bookkeeping system
- ☐ **PBase**—Relational DBase with query language
- ☐ **MailMaster**—Full-featured mail list manager
- [3] **PC-File+**—The most powerful DBase we have found (3 disks)

WORD PROCESSING

- [2] **PC-Write 2.71**—The most complete and popular word processor (2 disks)
- ☐ **Letter Writer**—Makes letter writing easier and more fun
- ☐ **PC-Pad 1.31**—An integrated word processor and spreadsheet
- ☐ **New York Word**—Complete with mail-merge, split-screens, and more

EDUCATION

- ☐ **Facts**—Teaches kids the states, presidents, capitals, etc (CGA)*
- ☐ **Typing Tutor**—It's easy to improve your typing skills with this handy teacher!
- ☐ **DOS Tutor**—This interactive tutor makes learning DOS easy for the new user
- ☐ **BibleQ**—Test your Biblical IQ in this fun setting
- ☐ **Spanish I**—Beginning Spanish for the student (requires BASICA or GWBASIC)
- ☐ **PolyGlot**—Provides a learning environment for basic vocabulatory of several languages
- ☐ **Word Processor for Kids**—Makes using the computer fun and educational (CGA)*

UTILITIES/APPLICATIONS

- ☐ **MasterKeys**—Like Norton Utilities, only better!
- ☐ **Desk Mates**—A disk full of Sidekick-like utilities
- ☐ **Home Inventory**—Keeps track of your personal items
- ☐ **HDMenu**—Puts the programs on your hard disk on menu. Has security features
- ☐ **SimCGA**—Allows a monochrome system to run most CGA programs
- ☐ **Slic-Works**—An all-in-one filer, letter writer, and communications program
- ☐ **Banner Maker**—Make your own custom banners with this easy-to-use package
- ☐ **Fast Food**—Evaluates the nutritional value of the products of most national fast food chains
- ☐ **ELISA Insults**—A hilarious version of the famous computer psychiatrist
- ☐ **Database Publisher**—Prints a catalog of up to 1000 items

GAMES

- ☐ **Striker**—Helicopter attack simulation. Risk is also included (CGA)*
- ☐ **3-D Packman**—is great! Also includes Kong and Spacewar (CGA)*
- ☐ **Q-Bert**—Play the famous arcade hit on your computer. Other games, too (CGA)*
- ☐ **Monopoly**—Great color and sound (CGA)*
- ☐ **JetSet**—A jet flight simulator
- ☐ **Hopper**—Great Frogger clone (CGA)*
- ☐ **Diamond Master Baseball**—Simulate the play-by-play of baseball
- ☐ **18 Hole Miniature Golf 3.0**—Exciting game for all ages (CGA)*
- ☐ **Wheel of Misfortune**—Sorry, Vanna White not included with your order!

*Color Graphics Adapter card required.

Free catalog with order or request

SOFTWARE EXCITEMENT
"Service with Excellence"
P.O. BOX 3072, CENTRAL POINT, OR 97502

No. of disks_____ Cost of Disks $_____

Shipping Info
1-4—add $2
5+—FREE
UPS 2nd Day—add $3

Shipping $_____
Total enclosed $_____
MAIL ORDERS: Use separate sheet—include phone

VISA (503) 772-6827 MasterCard
Mon-Fri 7am-10pm Sat-Sun 8am-6pm

CIRCLE 726 ON READER SERVICE CARD

■ SCIENTIFIC WORD PROCESSORS

Writer lets you draw horizontal, vertical, and angled lines and boxes.

PAGE-BREAK PROTECTION Another exceptionally nice feature of the program is its ability to protect a specified number of lines of a document as a sliding space. This protection could be used, for example, for a figure whose precise position in the text is not important but for which a page break would be unacceptable. The sliding space feature will print the figure on the current page if there is room or it will print it on the next page, pulling with it any lines of text that followed the figure.

On the negative side, *TechWriter* does not support paths, and simple directory features such as COPY or even DIR cannot be accomplished without exiting the document. Nor can you disable automatic backups of documents after a certain number of keystrokes have been made. Consequently, even if the changes made in a session are aborted, the original copy on the disk is still updated.

Even without its technical features, the word processor is very versatile, allowing for unlimited changes in formatting and providing for headers and footers and multiple indexes. Unfortunately, *TechWriter*'s support of columns is weak, since gutter widths cannot be specified and only even-width columns are possible. The program automatically reformats documents most of the time, but it is advisable to use the repagination command when you insert text or change the page numbering. Also, there is no error message when a print request is made while the printer is off-line. And there is no graceful way to abort printing.

TechWriter's documentation is complete and well above average. Once you manage to find information on a particular subject, it is clear and well explained; however, you may have to do some searching since the information you need might be scattered in several places. In addition, the documentation does a poor job of assisting you with the choice of suitable drivers for the more than 100 printers that *TechWriter* supports. The package's concise Quick Study Guide, concise containing pertinent examples, will get you off to a flying start.

Overall, *TechWriter* is pleasant to use and fully functional for most purposes. It is a good choice for users who are looking for a straightforward and painless way of creating technical documents.

—Caroline Halliday

Total Word

Lifetree Software's *Total Word* has a rich assortment of features, making it more than a typical word-processing program. It can capture and use graphic images, preview a full page, use different font styles and type sizes, and build equations or chemical diagrams using over 400 scientific characters. Plus, typical word-processing features are abundantly present in a mix of menus, function-key commands, and Shift/Alt/Ctrl-key combinations. Priced at $495, *Total Word* is a very full-featured program.

One of the pleasures of *Total Word* is learning it. Lifetree has produced an excellent manual and on-screen tutorial program. The tutorial helps you explore most of *Total Word*'s features in four lessons.

The main menu in *Total Word* has the look of *Volkswriter*, another of Lifetree's products. The top fifth of the screen lists 14 functions that are invoked by a single letter. These functions include retrieving,

EDITOR'S CHOICE

PC MAGAZINE FACT FILE

***Total Word*, Release 1.0**
Lifetree Software Inc.
411 Pacific St.
Monterey, CA 93940
(800) 543-3873
(800) 831-8733 (in Calif.)
List Price: $495

Requires: 480K RAM, hard disk drive, DOS 2.0 or later.

In Short: A very full-featured package, *Total Word* offers over 400 scientific characters for creating equations and chemical structures, a range of fonts and type sizes, the ability to capture and use graphic images from other programs, and powerful, elegant formatting features. In addition, it contains typical high-end word-processing features such as a spelling checker, a thesaurus, math functionality, nonprinting comments, and indexing. Not copy protected.

CIRCLE 634 ON READER SERVICE CARD

NO DEPOSIT NO RETURN

Lotus Symphony 2.0 Upgrades From Corporate Software

Miller Brewing Company wanted to make light work of upgrading its users to Lotus Symphony Release 2.0. Which meant they wanted fast delivery. With no deposits or disks to return. And no minimum purchase requirements.

Clearly a job for Corporate Software, the leading value-added supplier of personal computer products to large corporations.

Through the Corporate Software Upgrade Program, we shipped Miller their upgrades in less than 24 hours. Directly to users.

And because Miller is a Lotus Master Account, there were no disks to exchange.

Powerful Enhancements

Lotus Symphony Release 2.0 gave Miller powerful enhancements to their key business functions.

Like an improved word processor with built-in text outliner and 80,000-word spell checker. A more powerful database with menu driven editing. A faster spreadsheet with minimal recalc. A versatile graphics capability as well as VT100 emulation for improved communications. And no copy protection.

In one package, Symphony gave Miller five functions powerful enough to meet their growing computing needs. Without having to learn five separate packages.

20 Specialized Services

Making upgrades easy is just one of the ways Corporate Software helps large companies like Miller Brewing. We inventory hundreds of products for the IBM-PC and Apple Macintosh and back them with the largest independent support organization in the industry.

These resources help you evaluate, support, and upgrade products like Lotus Symphony Release 2.0 in the corporate environment. All at competitive prices.

To learn more about Corporate Software's 20 specialized services, call today. Then pick up your Lotus Symphony Release 2.0 upgrade. Or pick up a whole case.

1-800-426-7779

ATLANTA	NEW JERSEY
BOSTON	NEW YORK
CHICAGO	MINNEAPOLIS
DALLAS	SAN FRANCISCO
LOS ANGELES	WASHINGTON, D.C.
LONDON	TORONTO
MUNICH	

Symphony is a registered trademark of Lotus Development Corporation. IBM-PC is a registered trademark of International Business Machines Corporation. Macintosh is a registered trademark of Apple Computer, Inc.

CORPORATE SOFTWARE

Corporate Software Inc.

410 University Avenue

Westwood, Massachusetts 02090

CIRCLE 292 ON READER SERVICE CARD

creating, storing, and renaming a document and printing. The rest of the screen holds a list of files. You can retrieve these files by name or by pointing to them with the cursor and then pressing Enter. After you open a file you can use the program's scientific characters by calling up one of nine special, on-screen "keyboards." Pressing Alt-K pops up a menu window of keyboards across the top of the screen. The choices include Business/Bullets/Rules (Alt-2); Math/Logic/Sets (Alt-4); Subs & Supers/Math (Alt-5); Greek (Alt-6), and Organic Chemistry (Alt-0).

KEYBOARD DIAGRAMS When you select a keyboard, it appears at the top of the screen as a box diagram showing the alphabet keys as they appear on a typical keyboard. Each key box shows the appropriate letter and one or two symbols that can be printed by pressing the key alone or with the Shift key. For example, you can type the small integral symbol by pressing the F key on the Subs & Supers/Math keyboard, then switch keyboards and type the not-equal symbol by pressing Shift-G on the Math/Logic/Sets keyboard.

Scientific characters can be used only if you have a Hercules board or an EGA, VGA, or MCGA board. To print the special characters, you need a Hewlett-Packard LaserJet or compatible or a PostScript printer.

Using the scientific characters to build often-used equations or drawings of chemical compounds can be done with macros. The macros menu will pop up if you press Alt-M. Recording a macro is as simple as pressing R, then running through the right keystrokes. Macros are used to record building-block pieces of equations or diagrams, making it simple to create complex formulas or structures. Macros also do more mundane work, like inserting a trademark symbol or the Italian lira sign.

CAPTURING IMAGES Creating a scientific document involves more than just typing equations or diagrams. You might also want to incorporate special graphics material from other programs. You can capture these images from the screen by using a *Total Word* utility program, called Snapshot. First you have to exit the main *Total Word* program and go to the \TOTALPGM subdirectory to load Snapshot. Then you go to any other graphics program screen to capture your image using the Ctrl-Alt-Q combination. A thin frame will appear around the image to permit cropping. The cropped image can then be dropped into a text document at any point. It can extend from the left margin to the right margin or can be sized by percentages. If you choose a smaller size, the image can be placed flush-left, flush-right, or centered. You can also put a border around it, reverse the black and white portions, and adjust the balance of black and white

Facing your facts?

As the operator of a small business you are constantly being challenged to respond quickly. Easy and efficient access to your financial data is often critical to the success of your operation.

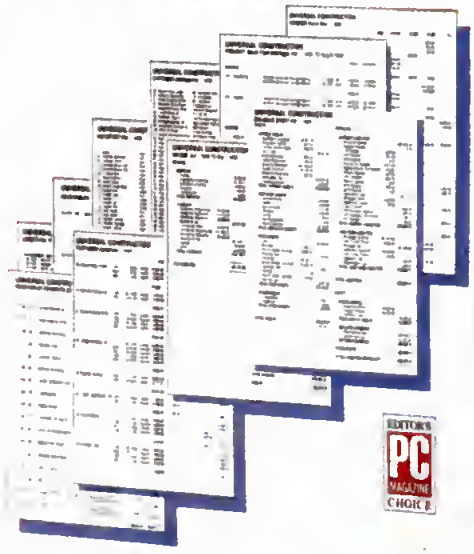
Bedford Integrated Accounting has been designed to let you face your financial facts quickly. Through fully integrated general ledger, receivables, payables, payroll, inventory and jobcosting, your records are as current as the latest entry.

With Bedford, financial reports are available immediately on your computer screen. No more rustling through stacks of paper for details of that transaction, or waiting days, sometimes weeks to see your financial position. You get the facts you need when you need them. Simply and comfortably.

If you find you're not able to respond as quickly as you would like, drop by your nearest Bedford dealer. They'll show you some facts about our $249 software we're sure you'll have no problem facing.

bedford®
making software comfortable™

bedford®
Integrated Accounting Software

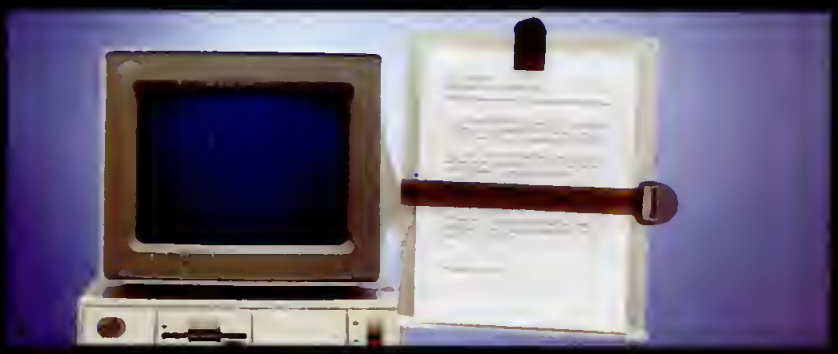


CIRCLE 482 ON READER SERVICE CARD

Bedford Software Corporation • 15311 N.E. 90th Street • Redmond, WA 98052 • (206) 883-0074

When you got your PC, it was love at first sight. How did it ever come to this? It's taken over your entire desktop. Your screen has disappeared beneath a thick layer of dust. The noise from your printer is driving you crazy. You just can't go on like this...

KENSINGTON CONVENIENCE



Don't do onything rosh. Kensington can put you and your PC back on good terms.

1. Our **Universal System Stand** gets your CPU off your desk ond out of your woy. Adjusts to fit ony PC up to 6½" wide. $29.95

2. Our onti-stotic **Dust Covers** protect your computer, monitor, ond keyboord from dirt ond dust. $19.95

3. Our **Printer Muffler 80** ond **Printer Muffler 132** (for 80 ond 132 column dot-motrix printers) reduce printer noise by 75 to 85%! Only $69.95 ond $89.95

4. Our **Printer Muffler Stand** roises your printer ond Muffler 4" for hondy poper storoge. $29.95

5. Our **Universal Copy Stand** puts your notes next to your screen, directly in your line of vision. Attaches to either side of ony monitor. $29.95

6. And our **Keyboard Slideaway** gives you the extro room you need for your keyboord. Slides under your PC when not in use. $49.95

For o free brochure on our full line of PC occessories, call 800-535-4242, 212-475-5200, or write Kensington, 251 Pork Ave. South, NY, NY 10010.

KENSINGTON®

© 1988 Kensington Microware Ltd

CIRCLE 272 ON READER SERVICE CARD

Tests Prove OTC Gives You 58% More Throughput Than Its Competition!

OTC 850XL — 1632 pages*

*Calculated for 8-hour day, based on actual 50-page print test
All printers run in 10 CPI, 6 LPI, 136 columns

Tall claims. Many companies say they offer the fastest printer with the best value for your money. At OTC, we decided to challenge those claims . . . and we won! We clearly deliver more throughput for your money.

We took five competitors and ran a Lotus™ 1-2-3 spreadsheet under the exact same conditions, to let you be the judge.* The OTC 850XL not only delivered 58% more throughput than its closest competitor, but also proved to be at least a 25% better value.

It's easy to make tall claims. But the others just don't stack up to Output Technology! ***Take a good look at who is standing tall above the rest . . . call OTC for a free copy of our Benchmark test today!***

1-800-422-4850

MADE PROUDLY IN THE U.S.A.

Over 200 Service Centers Nationwide

IBM, Genicom, Alps, Okidata, Epson, and Lotus are trademarks of others and do not belong to OTC.

OTC OUTPUT TECHNOLOGY CORPORATION

E. 9922 Montgomery, Suite #6, Spokane, WA 99206
(509) 926-3855, 800-422-4850
Telex #15-2269 OUTPUTSPOK FAX #922-4742

Output Technology Corporation Europe BV • Saturnusstraat 25 • 2132 HB Hoofddorp • The Netherlands • Telephone (31) 2503 32599 • Telefax (31) 2503 39555 • Telex 20000 REF MMC NLX505

CIRCLE 129 ON READER SERVICE CARD

with an exposure setting.

The graphic image itself will not appear on the document screen. You can view it at the graphics menu to be sure it's the right image, but it appears in the document as a command line. Through *Total Word*'s page preview function, you can see how much vertical space it will take up on a page or in a column, but the left/right size won't show, nor will the border.

Previewing a page is very useful for getting an overall feel for the look of a format, but unfortunately that's all. The type is generally unreadable, font styles won't show, and subtle changes in point size can't be made out. A close-up option in preview mode will display a portion of the page as it will print, but the type is very blocky. However, in this close-up view, you can see the scientific, boldface, and italic characters—all in relative size and readable.

ROBUST FORMATTING FEATURES

One of the more-powerful aspects of *Total Word* is its formatting abilities. You can change the format of a document line by line by using section layouts. Each section

PC MAGAZINE EDITOR'S CHOICE

- **T^3**
- **Total Word**

If you need the extra functionality that scientific-technical word processors offer, in many cases you may have to sacrifice speed or standard WP features. For example, TCI Software Research's T^3 *($595) was one of the slowest programs we evaluated, but it is strong on alternate character sets, offering mathematical and chemical symbols as well as the Greek and Russian alphabets. If you need special symbols that* T^3 *does not include, you can use its font editor to create them. Standard document control commands and a spelling checker, which typify corporate word processors, are also part of* T^3*'s repertoire.*

Lifetree Software's Total Word *($495), the successor to* Volkswriter *and* Volkswriter Scientific, *goes even further than* T^3 *in bridging the gap between the worlds of corporate and scientific-technical word processing. The package has several alternate keyboards and a full range of typical word-processing features, including a spelling checker and a thesaurus, indexing, nonprinting comments, mail-merge, and automatic hyphenation. Not only does it give you access to over 400 scientific characters, but its Snapshot program lets you capture graphics from other programs, making it useful as a desktop publishing tool.*

Groucho Marx's statement "I wouldn't want to belong to any club that would accept me as a member" could apply to our contention that Lotus Manuscript *is a strong contender for Editor's Choice—despite the fact that Lotus no longer wants to market the package in this product category. In fact, had* Manuscript *not been between versions during our evaluation, it would have been an Editor's Choice. That* Manuscript *excels at handling large documents and could go up against any corporate-level word processor is undeniable. Moreover, its equation language, which lets you enter equations by using descriptive English-language keywords, is one of the most commonsense approaches to mathematical keystroking we've seen. If you're writing a long, highly structured document replete with equations, tables, footnotes, and indexes,* Manuscript *is worth considering.*

Use it or lose it!

Use DataSaver

standby uninterruptible power supply, and protect your microcomputer against costly data loss and hardware damage.

- Constant AC line protection against power disturbances and interruptions.
- Built-in spike/transient suppression and EMI noise filtering.
- Powerful sizes to protect any system from the earliest Apples to the latest PS/2's. International models, also.

For more information, call:
TOLL-FREE 800/332-3440.
In California, call 805/541-4160.
Or write to us at the address below.
GSA No. GS 00K-87-AGS5393 PS01
Dealer/VAR inquiries invited

Cuesta Systems Corporation
3440 Roberto Court
San Luis Obispo, CA 93401

CIRCLE 383 ON READER SERVICE CARD

layout lets you set line spacing, lines per inch, tabs and margins, justification, and the number of columns. Once you create a section layout, it can be used anywhere in a document; existing text can always be reformatted later if you want to apply a different layout.

By using section layouts—which are indicated in a status area at the bottom of the screen—you can instantly change groups of format parameters. For example, you might go from an indented, nonjustified line of text 75 characters wide, with 12 on 13 leading, to two columns of text 35 characters wide, right justified and with 12 on 12 leading, just by pressing three keys in rapid succession.

Besides creating a section layout, you can create a single page layout that specifies parameters for such elements as continuous paper form or single sheet, paper length, paper width, top and bottom margins, pagination, line numbering, and others. The page and section layouts are saved with the document, and you can have up to 255 different section layouts for each document.

By giving your document a file extension, you create a style sheet—a combination of section layouts and a page layout—that is available every time you start a new document with the same file extension. Style sheets make it incredibly easy to produce consistent-looking reports, scientific manuscripts, memos, letters, and legal documents. And yet, layouts can be changed for an individual document without affecting the style sheets.

Section layouts can also specify type styles. *Total Word* lets you control all the resident fonts, as well as fonts from cartridges and downloaded fonts that a printer contains. You can even create a new type style by choosing the size, weight, and style of the characters from the available typefaces and then selecting certain characteristics to emphasize, underline, change in color (if your printer has color), and shadow. The type style can be changed at any point and for as much text as you wish, regardless of the prevailing type style in the section layout.

Total Word has a host of other features typically ascribed to quality word-processing packages: a spelling checker (with 170,000 words); a thesaurus (with 300,000 words, including synonyms and antonyms); indexing capability; mail-merge; a full range of editing, copying, moving, and deleting functions; search-and-replace; headers, footers, and footnotes; automatic hyphenation (in a user-definable zone); a split-screen mode; basic math functions; word count, nonprinting comments, and on and on. In short, there is little if anything missing from this full-featured word-processing package.

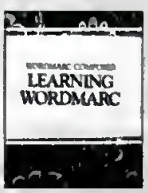
—Henry Fersko-Weiss

WordMarc Composer

WordMarc Composer, from Marc International Software, is a comprehensive word processor designed for technical and scientific document preparation. With easy access to three different technical character sets and multilingual character formatting, the $375 program also includes some of the most complete and precise documentation you'll find.

In addition to running on PC-compatible micros, *WordMarc Composer* is avail-

PC MAGAZINE FACT FILE



***WordMarc Composer*, Version 86.0908C2**
Marc Software International Inc.
260 Sheridan Ave.
Palo Alto, CA 94306
(415) 326-1971
List Price: $375
Requires: 512K RAM, hard disk drive, DOS 2.0 or later.
In Short: A comprehensive word processor designed for scientific-technical documentation across a number of micro and minicomputer environments. However, its on-screen text-formatting interface may limit its appeal to nonscientific professional users. Not copy protected.

CIRCLE 633 ON READER SERVICE CARD

PC MAGAZINE EDITOR'S CHOICE

"If it's electronic mail capabilities you're after, we recommend cc:Mail LAN Package."

—PC Magazine, Editor's Choice Award, June 14, 1988

No wonder cc:Mail is the best-selling PC E-Mail package for any LAN, including IBM 3Com Novell.

1-800-448-2500 for cc:Mail today.

©1988 cc:Mail. CIRCLE 722 ON READER SERVICE CARD cc:Mail is a trademark.

With LAP-LINK, They're All Talking.

The Standard in Accessibility Software for IBM and Compatibles, Laptops, and Apple Macintosh Computers.

Now you can take advantage of the best performance qualities of today's popular computer standards.

Because with Traveling Software's line of Accessibility products, you can connect and share files between practically every kind of personal computer on the market today.

All kinds of files. Like word processing and desktop publishing files. Spreadsheet files. Database files. You name it.

Just choose the LAP-LINK product that best fits your needs.

LAP-LINK LAP-LINK transfers files between IBM and compatibles, laptops and desktops including the IBM PS/2. It installs in seconds, offers a split screen design, showing files in both computers, and can transfer them at incredible speeds of up to 115,200 baud. LAP-LINK comes complete with diskettes, documentation and a universal cable.

LAP-LINK received PC Magazine's Editor's Choice and "Best of '87" awards.

LAP-LINK PLUS! Having all the file transfer features of LAP-LINK, LAP-LINK Plus also provides the option of direct disk drive and printer sharing between any two connected computers. It's like having a two computer network!

LAP-LINK Mac Everything you need to share files between any model of the Apple Macintosh (512, Plus, SE and Mac II) with an IBM or compatible laptop or desktop computer (including the IBM PC, XT, AT, and PS/2). It's easy to use, easy to set up and it's fast. Transferring files at an incredible 57,600 baud! LAP-LINK Mac is also fully compatible with both Macintosh Finder and MultiFinder as well as AppleTalk, TOPS, 3Com, and Novell networks.

So for the best Accessibility Software, stop by your local computer or software dealer today. Or call us at: 1-800-343-8080 or in Washington: 1-206-483-8088. Ask us about our FREE catalog.

LAP-LINK is surprisingly affordable at $129.95, LAP-LINK Plus $139.95 and LAP-LINK Mac $139.95 (Suggested retail prices including cable).

Traveling Software

CIRCLE 222 ON READER SERVICE CARD

Traveling Software • 19310 North Creek Parkway • Bothell, WA 98011

Macintosh, AppleTalk, Finder, MultiFinder, and Apple are trademarks of Apple Computer, Inc., IBM is a trademark of International Business Machines Corp., 3Com is a trademark of 3Com Corp., Novell is a trademark of Novell, Inc., TOPS is a trademark of Sun Microsystems, Inc., Traveling Software, LAP-LINK, LAP-LINK Plus and LAP-LINK Mac are registered trademarks of Traveling Software, Inc.

Memory Lane

FIND ANYTHING on your hard disk... in seconds!

In contents of all files—word processor, databases, source programs, accounting, random notes.

Instant Search. **Alt+■** Hot key from any program. Type word, word root, word proximity, number, or phrase, with wild cards.
F2 List of all files containing search term appears *in seconds.*
↵ Select file. Term appears highlighted in its surrounding text or data.
←↑↓→ Navigate.
F8 next hit or **F10** next file.
Alt+p Cut-and-paste into your word processing document.

Search without indexing OR index once to make *searches 50 times faster* (while your best customer is still on the phone).

Automatic indexing. **F9** World's *fastest indexing* and *smallest index* (15%). Up to 7,500 files, 30 megabytes.
Folders, to organize your data.

Memory Lane, the *essential companion* to your DBMS or word processor for random information management and full-text retrieval. **$149**

Group L Corp., 481 Carlisle Dr., Herndon, VA 22070 (703)471-0030
Send _____ copies of Memory Lane at $149 each. VA residents add 4.5%
☐ Check ☐ MasterCard
☐ VISA ☐ American Express
Exp. Date_____
Card No._____
Signature_____
Name_____
Company_____
Street_____
City_____
State_____ Zip_____
Telephone_____

Call 800 672-5300

CIRCLE 502 ON READER SERVICE CARD

■ SCIENTIFIC WORD PROCESSORS

able for a wide variety of Unix-based minicomputers, including ones from Sun, Apollo, AT&T, and Prime and the DEC VAX. Since the package includes telecommunications and file transfer capabilities, the PC version can send copies of a document directly to a minicomputer host.

That's the good news. Unfortunately, the screen interface, apparently written to accommodate a variety of video terminals (which makes it easier to move the software to other computers), is sadly lacking when compared with the current crop of WYSIWYG word processors. While this could not be overlooked if the package were targeted at corporate users, the package's strengths in scientific and technical document preparation make its interface tolerable.

THOROUGH DOCUMENTATION *WordMarc Composer*'s almost excruciatingly thorough documentation includes five manuals, each one representing a different level of expertise. A map in the front of each shows its position in the hierarchy and contains a brief description of all of the manuals. Novices will be taken smoothly through each step of using the program, but more-experienced users can skim the first two manuals and get right into advanced document preparation.

The technical reference manual tells you everything you want to know about the product. With detailed sections on the file formats used and on creating your own printer drivers (using English-language descriptions), you'll wonder if the source code for the product was included, too. And while Marc International offers technical support for $50 a year (90 days free), you probably won't need it in light of the comprehensive documentation.

Installing *WordMarc Composer* is a snap. The installation program can be rerun at any time, to accommodate a change in monitors or a switch to either a different technical character set or another set of printer drivers. (Up to ten are available at a time, and over 170 drivers come with the program.)

In addition, the installation program is among the most intelligently written ones I've seen. Not only did it ask permission before making changes to my AUTOEXEC.BAT and CONFIG.SYS files, but it was also smart enough not to make changes where my current configuration was sufficient.

WordMarc Composer has three technical character sets available: Greek, chemical, and DecTech. In addition, the conventional English alphabet can be modified to reflect European punctuation with a few keystrokes. Any monitor can be used, with the exception that computers using monochrome monitors require an EPROM from the vendor to generate the technical characters (but the European punctuation is still available without an EPROM).

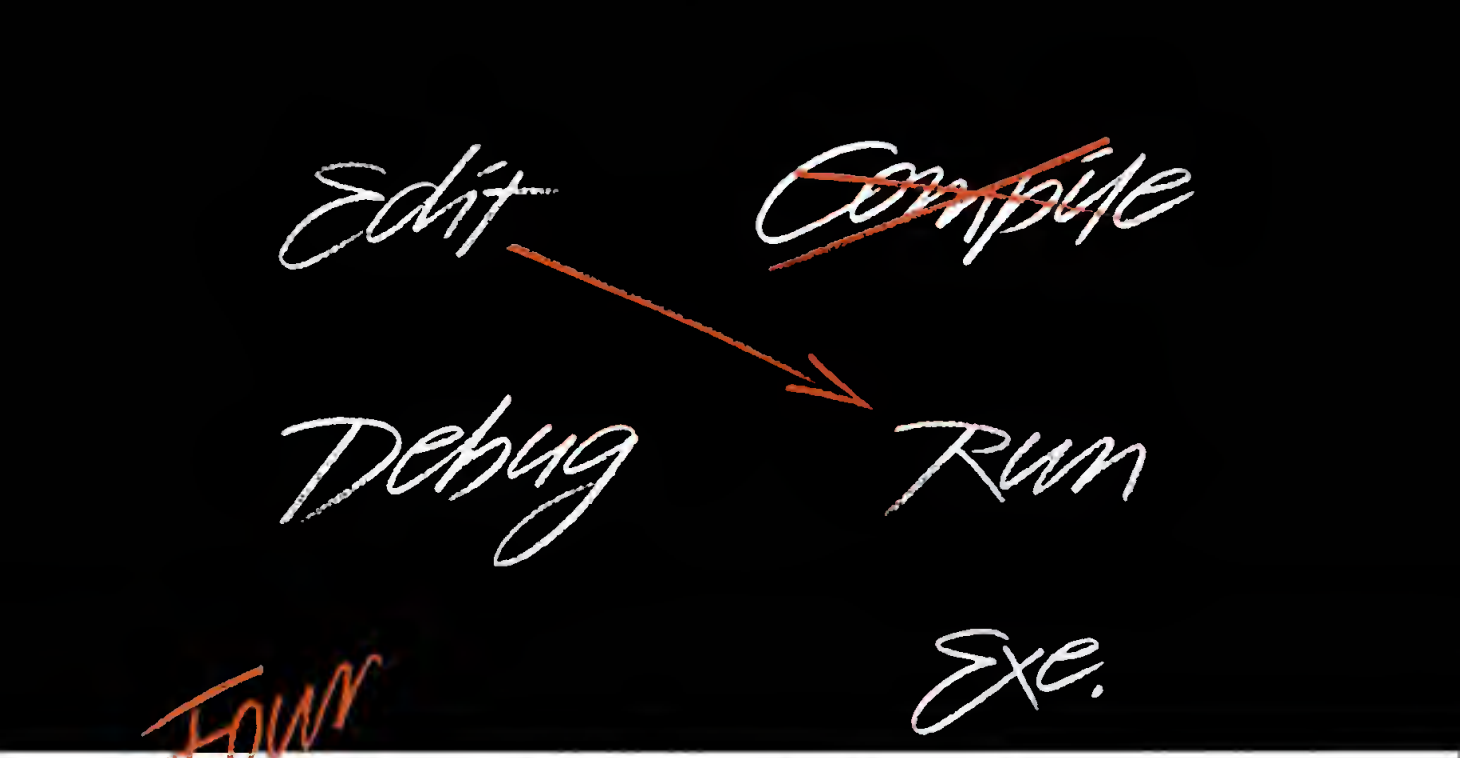
Unlike most mainstream editors and word processors, *WordMarc Composer* does not strictly follow convention in its use of the PC editing keys. While this may limit its appeal to some users, several templates, guides, and diagrams displaying the keyboard configuration are provided.

WordMarc Composer is not a WYSIWYG word processor—a shame, since it handles scientific and technical text so well. Almost all on-screen document-formatting capability revolves around the use of a "format line," which is a ruler line that controls all text following (until another format line is encountered). An unlimited number of format lines can be used to control any text of any size.

Users who are accustomed to typesetting environments may find this helpful, but it does disrupt the screen. There also is a preview capability, which will display a formatted document on the screen as an alternative to printing it.

UNINTEGRATED FUNCTIONS The processes of designating, moving, copying, and deleting objects while editing are not well integrated. Each one is separate and requires you to place your cursor at one end of a block of one or more characters, specify the operation (move, copy, erase), designate the remaining text, and press the "execute" key (Plus on the numeric keypad).

WordMarc Composer is also unable to perform point-and-shoot operations on text objects. Text objects as such (words, lines, sentences, and paragraphs) are unknown to *WordMarc,* and there is no way to designate a piece of text without moving the cursor over its characters or lines. Nor can you designate an object from its mid-



Four Five steps to instant programming.

Microsoft® QuickBASIC 4.0 is a revolution in BASIC programming. A revolution that earned *PC Magazine*'s Best of 1987 award and its Award for Technical Excellence for the last two years.

Instant programming means instant results.

With Microsoft QuickBASIC 4.0, you get a complete instant programming environment. Revolutionary technology lets you run, edit, debug, and then continue running your program. Without a time-consuming compile step.

So you get instant results *and* instant productivity.

Instant programming also means you're always ready to debug using a sophisticated collection of debugging tools. Control program execution easily with breakpoints. Use watchpoints and watch expressions to see data values as your program runs. Even change data values and continue running!

Advanced language extensions such as records, recursion, huge arrays, and FUNCTION procedures give the language more power and versatility, so you can really flex your BASIC muscles. And Microsoft QuickBASIC 4.0 still produces the fastest BASIC code around.

A great value gets better.

At $99 Microsoft QuickBASIC 4.0 is a great value. And now it's even better because it includes our *Value-Pack Catalog* containing coupons worth more than $600 on add-on packages and books. And if that's not enough, there's a 30-day money-back guarantee. You just can't lose.

Take the first step into instant programming. Just call us at **(800) 541-1261, Dept.E21,** for the name of your nearest Microsoft dealer and start your own revolution in instant programming with Microsoft QuickBASIC 4.0.

Microsoft QuickBASIC 4.0

Microsoft is a registered trademark of Microsoft Corporation. Offer valid only in the 50 U.S. States.

dle. For instance, you must move the cursor to the beginning of a paragraph, specify the operation, and then move to the end.

Another annoying feature of editing a document with *WordMarc Composer* is its default overstrike mode. There is no insert mode as it is known elsewhere. *Everything* can be overwritten almost all the time. To insert text, you must position the cursor, press the Ins key, insert the text, and press "execute." Then you are returned to overstrike mode. To insert text elsewhere, the process must be repeated.

What must also be noted is that a limited on-line help facility is available, and that *WordMarc Composer* has a very powerful macro capability. The Undelete function, in fact, is actually implemented as a macro.

In all fairness, Marc International has slated the release of a major upgrade, *WordMarc Composer Plus*, to be available by the time this review hits the newsstands. Some if not all of the weaknesses of the current product may be remedied in the new version.

WordMarc Composer Plus, according to the vendor, will include text-sorting capabilities; an on-screen calculator; an overstrike/insert mode toggle (relieving the current overstrike-only problem); an enhanced dictionary (over 100,000 words); a spelling checker that operates while you edit; 20 different additional type styles; the ability to integrate graphics, Lotus .PIC files, and PostScript files; complete PostScript laser printer support, and automatic pagination and reformatting. The maximum right margin will be increased to 254 characters, line spacing will be able to be fine-tuned in increments of 1/100 inch, and extensive automatic date capabilities will be added. The new version will also let you convert documents to *Ventura Publisher* format.

Overall, the on-screen formatting interface is the only real stumbling block for this otherwise complete and comprehensive word processor. Despite this weakness, it is a strong contender in the scientific-technical document-preparation marketplace.—**Richard Hale Shaw** PC

■ Unlike most word processors, *WordMarc Composer* doesn't strictly follow convention in its use of the PC editing keys.

MIRROR II™

Crosstalk XVI® Users Call 1-800-634-8670 For A Unique Upgrade Offer

The Closer You Look... The More You Find!

Like this Russian Doll, a careful inspection of MIRROR II will reveal layer upon layer of carefully crafted features designed to provide you with the best solution to today's and **tomorrow's** data communication problems.

MIRROR II (the Crosstalk® SuperKlone) provides a superior reflection of the best in Crosstalk XVI®, at a fraction of the cost. MIRROR II comes complete with a superset of the Crosstalk XVI® Script language. This Scripting capability and MIRROR II's background communications mode gives you the power to fully automate your PC communications, and the freedom to use your PC for other tasks while sending or receiving data.

- Background communications mode (call or answer)
- File transfer protocols including Xmodem (Batch, CRC or Checksum), Crosstalk®, Hayes®, Ymodem and Kermit
- Terminal emulations for DEC VT-100/52, IBM 3101 (character or block mode), Televideo 910 / 920 / 925 (character or block mode), Adds Viewpoint, ADM-3A, Data General D210, ANSI and Honeywell VIP7200
- Learn mode for the automatic creation of auto-logon Scripts
- Full screen Wordstar-like text editor
- Site License (the cost effective way to standardize)
- 60-Day, No Questions Asked Money-Back Guarantee

MIRROR II

A Better Reflection

SOFTKLONE™

$69.95 To order, call Toll-Free: 1-800-634-8670

(In Florida call 904-878-8564) Visa / MasterCard / COD $5.00 for Shipping and Handling ($8.00 for COD orders) Florida residents please add 5% sales tax.

336 Office Plaza Drive
Tallahassee, Florida 32301
Telephone (904) 878-8564
Telex: 6714280 KLON

MIRROR II and SoftKlone are trademarks of SoftKlone Distributing Corp. / IBM is a registered trademark of International Business Machines Corp. / WordStar is a registered trademark of MicroPro International / Crosstalk and Crosstalk XVI are registered trademarks of Digital Communications Associates Inc. / Hayes is a registered trademark of Hayes Microcomputer Products Inc.

MIRROR II is designed for use on IBM and 100% compatible microcomputers (including the IBM PS/2 line) running MS-DOS / PC-DOS 2.0 or higher and is not copy protected

CIRCLE 478 ON READER SERVICE CARD

LAN WAR

AXON declares the LAN WAR for the benefit of those who demand flexibility, performance, and support—no matter how little it costs.

Flexibility and performance are provided by AXON XT and AT workstations and by two AXON LAN models!

The AXON Serial Network (S100) uses the installed serial port of the computer. The AXON High Speed Network (F200) is equipped with a 2 MB card. Both models come with the necessary hardware and software. Features include: Disk, Directory and Printer Sharing; File and Record Locking and Sharing; Electronic Mail; easy to use Pulldown Menus; Twisted Pair Wiring; NETBIOS Compatibility; and More...

So, if you anticipate light traffic on a small network, buy AXON S100 for **$89** per node. For more power and speed, buy AXON S200 for **$249** per node.

Call the number below and AXON will tell you why flexibility, performance, support, and price will turn the LAN WAR in to your profit.

AXON COMPUTERS, INC.
9025 Wilshire Boulevard, Suite 204 • Beverly Hills, CA 90211
CALL: 1-800-422-AXON

AXON™
COMMUNICATING INTELLIGENCE

CIRCLE 395 ON READER SERVICE CARD

You know what you're looking for in an accounting system. Power. Flexibility. Ease of use. Now **Peachtree Complete II: The Business Accounting System** offers more. More features. More functions. And an enhanced user interface that not only looks great, but makes accounting easier and more efficient than ever before. All at a price that's substantially less than you'd expect. The first Peachtree Business Accounting System sold for $4,800. Now at just $199, Peachtree Complete II is a value you can't afford to ignore.

MORE COSTS LESS

PEACHTREE COMPLETE™ II:

Complete Accounting Is Still Just $199.

More Power, More Flexibility. We cut the price, but we certainly didn't cut corners. Today, Peachtree Complete II: The Business Accounting System is the most comprehensive accounting system you can buy at virtually any price. We've made enhancements to each of the eight modules that make up Peachtree Complete II. You can use them individually, or integrate them for maximum control and efficiency. You can even distribute them among separate computers. Over 250,000 Peachtree customers have already put these modules to work in their businesses.

- General Ledger
- Accounts Receivable
- Invoicing
- Accounts Payable
- Payroll
- Inventory
- Fixed Assets
- Job Cost

More New Features. Peachtree Complete II has a brand new look and an entire range of state-of-the-art features to make your accounting procedures easier and more effective than you thought possible. Peachtree's Complete II's latest features include:

- **Windows and Pop-Up Menus** make it easy to see what you're doing and where you want to go next. When you get ready to make a choice, just "aim and shoot."
- **Smart HELP** on-line, all the time. One keystroke gives you a pop-up rescue window full of context-sensitive information.
- **Quick and Easy Error Handling** gives error messages in plain English along with suggested solutions. No more complicated error codes.
- **Enhanced Report Capabilities.** Range printing allows you to print only what you need, only when you need it. A great feature for starting and stopping long reports. And now Complete II can produce over 450 reports.
- **Increased Numeric Capacities** to $999,999,999.99 in key areas. Plus, an unlimited number of companies.
- **Ongoing Tax Updates.** Complete II allows you to update your accounting tax files or you can order updates directly from Peachtree.
- **Service Invoicing,** the perfect addition to our product invoicing. Enter information free form on service invoices or store predefined paragraphs.

*"...best documentation...superb manuals ...head and shoulders above the manuals for other low-priced systems..."**

More Confidence. Peachtree Complete II includes comprehensive documentation to get you started and help you along the way: a separate quick-start Installation Guide, Accounting Primer, eight-volume Reference Library, and extensive Tutorials on each application—all at no extra charge! Plus, we stand behind all our products with a toll-free hotline for technical support ($1 per minute, $20 minimum) and an established network of support centers across the country.

COMPARE FEATURE FOR FEATURE

System-Wide Features
- Over 450 reports
- Unlimited number of companies and consolidations
- Automatic menu-driven conversion of your existing Peachtree Business Accounting data files
- Increased numeric capacities to $999,999,999.99 in key areas

General Ledger
- Chart of Accounts includes 76 suggested and 26,000 user-defined accounts.
- 1 to 13 user-defined fiscal periods
- Repeating journal entries
- Financial statement comparisons may include current period and year-to-date with budget and/or prior period comparison
- Reversing journal entries

Accounts Receivable/Invoicing
- Open item or balance forward customers
- Up to 14,400 customers
- Supports partial payments
- User-defined terms codes and aging periods
- Automatic transactions with monthly, bi-monthly, quarterly, semi-annual, and annual frequency options

Accounts Payable
- Up to 14,400 vendors
- Partial payments of invoices
- Cash requirements forecasting by due date
- User-defined billing cycle on automatic invoices
- Checks printed with unlimited invoice listing on stub
- Ability to void and reprint checks

Inventory
- Supports average, last purchased and standard costing methods
- Up to 19,500 inventory items (SKUs)
- Automatic price change on multiple items by percent or amount

Fixed Assets
- Handles 13,000 assets and 13 methods of depreciation
- Updated to handle current tax laws

Job Cost
- Tracks costs and profitability on a job-by-job basis
- Compares estimated costs with actual costs for specific tasks

Payroll
- Built-in current year federal, state, city and county tax tables for all 50 states with automatic calculation capabilities
- Automatic payroll processing supporting hourly, salaried, commission or draw-against-commission pay types
- New tax laws incorporated into program
- Processes up to 3,900 employees
- Supports Cafeteria Plan
- User modifiable tax tables with updates published regularly by Peachtree Software
- Printed and magnetic media W-2s generated automatically

More Satisfaction or Your Money Back. We stand behind all our products with a **30-day money-back guarantee** when you buy directly from Peachtree. If you're not satisfied, simply return the product in saleable condition within 30 days and receive a prompt refund. (A $20 restocking fee applies to all returns.)

Less Money. Peachtree Complete II gives you more for less. More power, more flexibility, more features, more options, and more confidence for a low, low $199. Call today to begin enjoying the benefits of Peachtree Complete II, the accounting system you can count on.

*"The wide range of modules, low price, and solid documentation make this a top choice."**

More Power with PDQ II and Timeslips. Extend the power of Peachtree Complete II with **Peachtree Data Query II.** PDQ II lets you transfer your valuable Peachtree accounting information to Lotus 1-2-3®, dBASE® and other databases and spreadsheets for further analysis. Plus, PDQ II allows you to create custom reports such as invoices and statements. All for **just $199.**

And now Peachtree Complete II is compatible with **Timeslips® III,** a leading time and expense tracking program. With Timeslips III Accounting Link (TAL™), you can integrate your time and billing with your Peachtree accounting for total efficiency. Order Peachtree Complete II with Timeslips III now for just $399 and receive TAL (reg. $79.95) FREE.

**InfoWorld*, December 1987.

Hardware Specifications: Requires PC/MS-DOS version 2.0 or higher with 384K of usable memory and a minimum 10 MB hard disk. For use with the IBM® PC, PC XT, PC AT, Personal System/2™ and compatibles. 3½" media optionally available. Not copy protected.

Lotus 1-2-3 is a registered trademark of Lotus Development Corporation. dBASE is a registered trademark of Ashton-Tate Corporation. Timeslips and Time-Link Plus III are trademarks of North Edge Software Corp. IBM is a registered trademark and Personal System/2 is a trademark of International Business Machines.

**Call for international shipping rates.

CIRCLE 358 ON READER SERVICE CARD

Call Now to Order or for a Dealer Near You

1-800-247-3224

In Georgia, call 1-404-564-5800

To Order by Mail, Add $12.50 Shipping and Handling and Send to:** (In Georgia, add applicable sales tax)

Peachtree Software

A Member of the Intelligent Systems Family

4355 Shackleford Road, Dept. PCM, Norcross, GA 30093

■ PC LAB NOTES: REFRESH UTILITY ■ BRIAN K. ROEMMELE

INSTANT SPEEDUP FOR YOUR PC

This simple software technique squeezes more speed from your memory. Postponing the refresh cycle lets your PC spend more time computing.

You can learn a lot about how your PC works by studying the IC data books published by the manufacturers of its chips. While much of the material in such publications is agonizingly technical, you'll often turn up valuable tidbits that never found their way into IBM's *Technical Reference* manuals. I used this information, along with some further detective work (perusing the ROM BIOS listings), to develop a simple software technique you can use to speed up your computer.

Most PC compatibles today use VLSI (Very Large Scale Integration) chip sets, such as those produced by Chips and Technologies. A VLSI chip gathers the functions of many originally separate chips into one. In most cases, however, these large chips duplicate even some of the originally undocumented functions as well. What can complicate matters even further is that the VLSI chips may also include features that are not widely known.

You can look at a chip manufacturer's specifications and recommendations in two distinctly different ways. When designing a computer, it's a sound engineering practice to choose chips and components whose *average* ratings (as published by the manufacturer) meet your system's *worst-case* requirements. That way, when the system goes to production, all operations will be well within the capabilities of the chips.

But I spend most of my time finding the *maximum* limits of many chips in PCs. Since I'm dealing with an already-manufactured product, such as the IBM PC AT, I use the manufacturers' suggested maximum ratings for each chip as a starting point to experiment. Analyzing the original IBM PC AT in this way led me to discover that the CPU's crystal frequency could be increased by a huge amount with no adverse side effects.

Remember the V20? No, not the rocket. The redesigned and enhanced 8088 work-alike microprocessor from NEC. Just pop out the Intel unit, drop in the V20, and you could (and still can) realize anywhere from a 5 to 30 percent overall speedup in most applications. And testing the effect was easy—either you noticed a faster PC or you didn't. Needless to say, the V20 became a very popular upgrade (much to the dismay of Intel).

It's time now to add another speed booster to the list—though this time you do it in software. You can pep up the old PC again just by reducing the refresh rate. But before I show you how, let me tell you why it works.

PRODUCTIVITY INDEX

PC LAB NOTES
How reducing your chips' refresh rate can boost computing speed.
UTILITIES
SETMODE makes it easy to set your video mode and COM port parameters.
ENVIRONMENTS
A look at the OS/2 1.1 Presentation Manager and its graphical interface.
POWER PROGRAMMING
Changing incomplete filenames to fully qualified drive-and-path form.
SPREADSHEET CLINIC
Undocumented Query key method that lets you edit records instantly.
USER-TO-USER
Preventing DOS's APPEND command from destroying files.
POWER USER
Finding current drive and directory from *Clipper* and *dBASE III Plus*.
LANGUAGES
A simple program to merge C and assembler code listings.
PC TUTOR
Understanding bad sectors on hard disks; patching REMOVE.COM.
CONNECTIVITY CLINIC
Finding ARCnet's station address with BASIC and Ethernet's with C.

REFRESH MY MEMORY PCs, XTs, ATs, and most compatibles use Dynamic Random Access Memory (DRAM) chips for their 640K main memory. DRAM is very popular among PC designers because the chips have a low cost per byte and tend to share timing and voltage requirements with most Intel chips.

DRAMs may be thought of as a vast array of capacitors laid out in rows and columns. The capacitors in the DRAM have two usable states: charged (a binary one) and discharged (a binary zero). Because of their design, these capacitors can hold their charge only for a relatively short period of time. If the charge goes away, so does the data. To recharge the capacitors, therefore, the DRAM must be accessed periodically. This access is called a *refresh*.

■ PC LAB NOTES

The system hardware performs a refresh on a regular cycle to keep the data stored in the DRAM valid. It's important that the refresh cycle take place before the DRAM begins to discharge, or the data stored there will become corrupted. Another type of RAM, Static Random Access Memory (SRAM), on the other hand, doesn't require any refresh cycle. (See the sidebar "DRAM Versus SRAM" for further information on this different type of memory chip.)

WAIT STATES Don't confuse memory refresh with a memory *wait state*. A wait state is a technique used to slow down the CPU when it can receive data faster than the memory can fetch it (the rated access time). The original IBM PC AT, for example, had an 80286 CPU running at 6 MHz. For many unfortunate reasons, IBM used a wacky "piggyback" RAM arrangement custom-made for the AT. At that time, the 64K chips used to build the 128K piggyback RAM chips were available at only 200- and 250-nanosecond access speeds.

The 6-MHz AT has a clock cycle of 1/6 MHz = 167 ns. The installed RAM, however, was rated for a 200- or 250-ns. access time. To run at 6 MHz with no wait states, RAM with an access time of less than 167 ns. would have been required. So, the AT wound up with hardware that would produce one wait state for all memory on the system board to compensate for the fast CPU speed and slow RAM.

TIME TO REMEMBER The DRAM refresh cycle is performed automatically by a combination of two chips: the 8253 Counter/Timer and the 8237 Direct Memory Access (DMA) Controller. The hardware for this process is shown schematically in Figure 1. The DMA controller performs the actual refresh by reading all the memory locations and recharging the capacitors. (The IBM PC AT DMA hardware is constructed a bit differently and uses an 8254 Counter/Timer chip, but for our purposes it is functionally equivalent to the PC.)

The 8253 Timer Chip contains three separate timers. Timer 0 produces the system "hardware timer tick" that drives the BIOS time functions. Timer 1 is responsible for controlling the length of the period between DRAM refreshes. Timer 2 can be connected to the PC's speaker to give it a primitive sound-producing ability.

The refresh timer counts down from a programmed value, placed there by the BIOS, until it reaches zero. At that point, it notifies the DMA to start the refresh cycle

DRAM VERSUS SRAM

Dynamic Random Access Memory (DRAM) chips are the popular choice for memory storage on PCs. That's partly because they're less expensive per byte than their logical competitor, Static Random Access Memory (SRAM) chips. The DRAM design essentially requires using one transistor per bit. The immediate benefits of this are higher memory density and better use of the chip's silicon real estate. SRAM, by contrast, requires about eight transistors per bit. This means that fewer bytes of storage can be constructed per chip. Further, the more complex circuit causes a larger power consumption per byte.

If DRAM chips pack more memory per square inch and use less power, why is SRAM still around? Part of the answer lies in examining how the DRAM's single transistor per bit works.

The transistor used in the DRAM acts much like a capacitor that can temporarily store a 1 or a 0. But because a transitor makes a lousy capacitor, it loses its charge rather rapidly. DRAM is nothing so much as a leaky bucket that must be constantly refilled.

A circuit using DRAM requires refresh circuitry and some portion of the system's operating time to perform the refresh. In addition, the computer must deal with the delays encountered before DRAM can be read from or written to. Why, then, is DRAM still around? As in any design, power consumption, cost, and speed must all be considered individually.

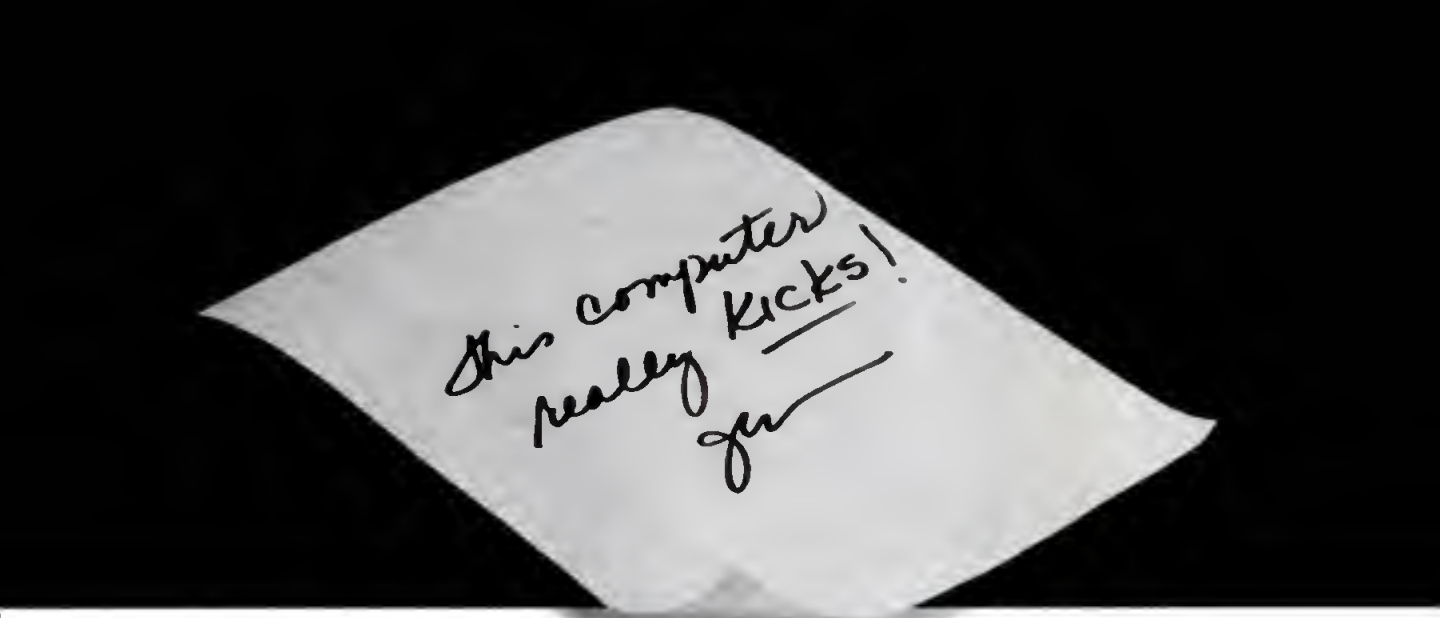
SRAM, on the other hand, is a more complicated circuit. One bit of storage is implemented as a flip/flop circuit which can be set to a 1 or a 0. The flip/flop remains in position until power is completely removed or until it is changed by storing a new value. Unlike the DRAM, no refresh cycle is needed; thus, no wasted time. The SRAM chip can be thought of as an array of on/off switches. Contrast that with DRAM, which will be fully corrupted if left alone too long.

Could you replace DRAMs with SRAMs to increase performance? Unfortunately, no. DRAM chips are not interchangeable with SRAM chips. They have vastly different support circuit requirements, and the pin assignments of comparable chips do not reasonably coincide. Simply plugging in SRAMs to increase performance is not possible.

To realize the best of both worlds, however, SRAMs *are* being designed into some PCs to complement DRAMs. When part of an original design, the individual characteristics of both types of RAM can be fully exploited. A few thousand kilobytes of SRAM are used to buffer large amounts of slower DRAM. The system can then match the high-speed I/O of the CPU with SRAM, while leaving the slower DRAM to catch up. In some cases new PCs are using SRAM exclusively to gain every edge in the race for higher performance.

The SRAM chips being manufactured today (for tomorrow's designs) promise lower power consumption, acceptable memory densities, and the ability to work with much faster CPUs. Exotic relatives of SRAMs are even finding their way into superfast 386-based systems.

The benefits of using SRAM and/or DRAM are beginning to converge. We'll see more PCs introduced using SRAM or SRAM and DRAM combinations, but it will be some time before the raw memory densities of cost-effective DRAM will be surpassed.—**Brian K. Roemmele**



"Of All the Comments We've Received on the Kaypro 286, this is the One We Like Best."

It's a fact. The KAYPRO 286 kicks...and kicks out all your old assumptions about the cost of truly advanced technology. Consider this.

At its top speed of 16 MHz, the KAYPRO 286 is faster, yet less expensive than most standard 386 systems.* And with the OS/2-compatible KAYPRO 286, adapting to rapidly changing standards doesn't mean reinventing the wheel.

Card-based system components – including the 80286 CPU – provide the ultimate in built-in non-obsolescence. Don't play catch up. Keep up with the better power machine...the "Best Buy" KAYPRO 286.

Your Authorized Kaypro Dealer is ready to give you all the details about the complete line of Kaypro desktop and laptop computers – and Kaypro's outstanding Credit and Leasing.

1 (800) 4KAYPRO

■ 8/10/16 MHz ■ OS/2 Compatible
■ 40 MB Hard Disk ■ 1 MB RAM ■ WordStar 4.0

Kaypro's Revolving Charge & Commercial Leasing

*Norton S.I. of 15.3 to 18.0. Also available with 12-MHz.
Trademarks: OS/2 International Business Machines, WordStar Professional Release 4.0, MicroPro International

KAYPRO CARD

KAYPRO® COMPUTERS
The Future's Built In

KAYPRO Lease-Link

CIRCLE 343 ON READER SERVICE CARD

UNLEASH YOUR 80386!

Your 80386-based PC should run two to three times as fast as your old AT. This speed-up is primarily due to the doubling of the clock speed from 8 to 16 MHz. The new MicroWay products discussed below take advantage of the real power of your 80386, which is actually 4 to 16 times that of the old AT! These new products take advantage of the 32 bit registers and data bus of the 80386 and the Weitek 1167 numeric coprocessor chip set. They include a family of MicroWay 80386 compilers that run in protected mode and numeric coprocessor cards that utilize the Weitek technology.

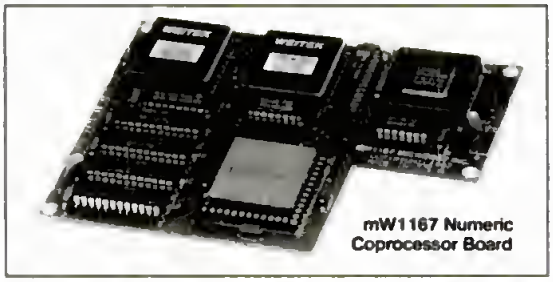
The benefits of our new technologies include:

- An increase in addressable memory from 640K to 4 gigabytes using MS-DOS or Unix.
- A 12 fold increase in the speed of 32 bit integer arithmetic.
- A 4 to 16 fold increase in floating point speed over the 80387/80287 numeric coprocessors.

Equally important, whichever MicroWay product you choose, you can be assured of the same excellent pre- and post-sales support that has made MicroWay the world leader in PC numerics and high performance PC upgrades. For more information, please call the Technical Support Department at

617-746-7341

After July 1988 call 508-746-7341



mW1167 Numeric Coprocessor Board

MicroWay® 80386 Support

MicroWay 80386 Compilers

NDP Fortran-386 and **NDP C-386** are globally optimizing 80386 native code compilers that support a number of Numeric Data Processors, including the 80287, 80387 and mW1167. They generate mainframe quality optimized code and are syntactically and operationally compatible to the Berkeley 4.2 Unix f77 and PCC compilers. MS-DOS specific extensions have been added where necessary to make it easy to port programs written with Microsoft C or Fortran and R/M Fortran.

The compilers are presently available in two formats: Microport Unix 5.3 or MS-DOS as extended by the Phar Lap Tools. MicroWay will port them to other 80386 operating systems such as OS/2 as the need arises and as 80386 versions become available.

The key to addressing more than 640 kbytes is the use of 32-bit integers to address arrays. NDP Fortran-386 generates 32-bit code which executes 3 to 8 times faster than the current generation of 16-bit compilers. There are three elements each of which contributes a factor of 2 to this speed increase: very efficient use of 80386 registers to store 32-bit entities, the use of inline 32-bit arithmetic instead of library calls, and a doubling in the effective utilization of the system data bus.

An example of the benefit of excellent code is a 32-bit matrix multiply. in this benchmark an NDP Fortran-386 program is run against the same program compiled with a 16-bit Fortran. Both programs were run on the same 80386 system. However, the 32-bit code ran 7.5 times faster than the 16-bit code, and 58.5 times faster than the 16-bit code executing on an IBM PC.

NDP FORTRAN-386™ $595
NDP C-386™ $595

MicroWay Numerics

The **mW1167™** is a MicroWay designed high speed numeric coprocessor that works with the 80386. It plugs into a 121 pin "Weitek" socket that is actually a super set of the 80387. This socket is available on a number of motherboards and accelerators including the AT&T 6386, Tandy 4000, Compaq 386/20, Hewlett Packard RS/20 and MicroWay Number Smasher 386. It combines the 64-bit Weitek 1163/64 floating point multiplier/adder with a Weitek/Intel designed "glue chip". The mW1167™ runs at 3.8 MegaWhetstones (compiled with NDP Fortran-386) which is a factor of 16 faster than an AT and 2 to 4 times faster than an 80387.

mW1167 16 MHz $995
mW1167 20 MHz $1595

Monoputer™ – The INMOS T800-20 Transputer is a 32-bit computer on a chip that features a built-in floating point coprocessor. The T800 can be used to build arbitrarily large parallel processing machines. The Monoputer comes with either the 20 MHz T800 or the T414 (a T800 without the NDP) and includes 2 megabytes of processor memory. Transputer language support from MicroWay includes Occam, C, Fortran, Pascal and Prolog.

Monoputer T414-20 with 0 meg[1] ... $995
Monoputer T800-20 with 0 meg[1] ...$1495

Quadputer™ can be purchased with 2, 3 or 4 transputers each of which has 1 or 4 megabytes of memory. Quadputers can be cabled together to build arbitrarily fast parallel processing systems that are as fast or faster than today's mainframes. A single T800 is as fast as an 80386/mW1167 combination!

Biputer™ T800/T414 with 2 meg[1] $3495
Quadputer 4 T414-20 with 4 meg[1] ...$6000

[1]Includes Occam

80386 Multi-User Solutions

AT8™ – This intelligent serial controller series is designed to handle 4 to 16 users in a Xenix or Unix environment with as little as 3% degradation in speed. It has been tested and approved by Compaq, Intel, NCR, Zenith, and the Department of Defense for use in high performance 80286 and 80386 Xenix or Unix based multi-user systems.

AT4 – 4 users $795
AT8 – 8 users $995
AT16 – 16 users $1295

Phar Lap™ created the first tools that make it possible to develop 80386 applications which run under MS-DOS yet take advantage of the full power of the 80386. These include an 80386 monitor/loader that runs the 80386 in protected linear address mode, an assembler, linker and debugger. These tools are required for the MS-DOS version of the MicroWay NDP Compilers.

Phar Lap Tools.....$495

PC/AT ACCELERATORS

287Turbo-10 10 MHz.....$450
287Turbo-12 12 MHz.....$550
287TurboPlus-12 12 MHz $629
FASTCACHE-286 9 MHz $299
FASTCACHE-286 12 MHz $399
SUPERCACHE-286 12MHz $499

MATH COPROCESSORS

80387-20 20 MHz..... $725
80387-16 16 MHz..... $475
80287-10 10 MHz..... $295
80287-8 8 MHz $239
80287-6 6 MHz $155
8087-2 8 MHz $154
8087 5 MHz $99

MicroWay

The World Leader in PC Numerics

P.O. Box 79, Kingston, Mass. 02364 USA (617) 746-7341
32 High St., Kingston-Upon-Thames, U.K., 01-541-5466
St. Leonards, NSW, Australia 02-439-8400

CIRCLE 331 ON READER SERVICE CARD

■ PC LAB NOTES

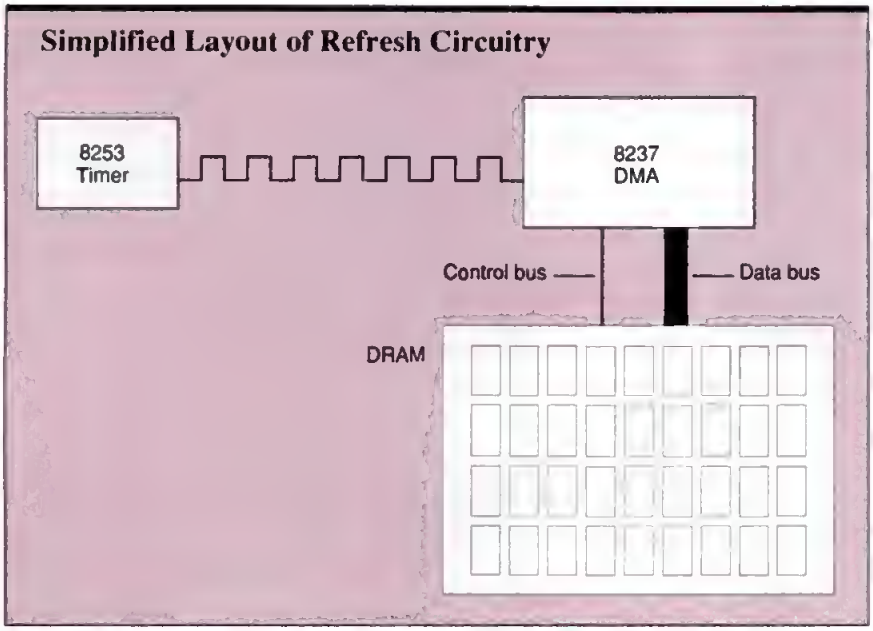


Figure 1: *This simple block diagram shows the fundamentals of the refresh circuitry.*

and begins counting down again. Once it has been initiated, refreshing the DRAM assumes the highest priority: it takes precedence over all other system activities. Each refresh cycle exercises a single 64K block of system DRAM. So, a system with 640K of DRAM would require ten refresh cycles to refresh the entire memory space. This cycle is repeated continually as long as the system is operating.

TALK TO MY REGISTERS The DMA and 8253 Timer chips use registers to communicate with the outside world. The registers are mapped into the PC's input/output (I/O) address space, which allows us to access them directly with simple commands. This direct line of communication will let us alter the value of any writable register. (Some registers are "read-only" and don't allow this.) In most cases, a register's value can be read as well. (In the case of the timer chip, the register contains

When your basic quantum leap is just not enough:

PROBAS™
Professional Basic Programming Library

PROBAS is a library of routines that kicks QuickBASIC and BASCOM into 5th gear and gives you powers and abilities far beyond those of mortal men. It's the greatest thing since sliced bread and if you don't get it today, your hard disk will crash in retaliation. So much for the hype. now down to brass tacks:

- **232 routines (226 in Assembly)**
- **600 page 3-part manual**
- **Full-featured windowing**
- **Soreen snapshots**
- **Virtual soreens in memory**
- **Lightning-fast file I/O**
- **Access EMB as files or arrays**
- **Full mouse support**

Plus 200 essential services from directory and equipment routines to handy string, date, time, and input routines. Whether you are just starting out, or a programming guru, PROBAS will help you generate faster, more efficient code, in far less time -- and we back that statement with an unconditional money-back guarantee! Thousands of programmers have benefited from PROBAS and its shareware precursor, *ADVBAS*. For all versions of QuickBASIC and BASCOM including BASCOM 6.0 for OS/2. ***Just $99.00!***

PROBAS™ TOOLKIT

The PROBAS TOOLKIT is a collection of assembly and BASIC modules that use the PROBAS library to save you even more hours of grunt work. Call up a ring, bar, pop-up, or pull-down menu. Pop a mini-word processor with word-wrap in a window. Put a list or file directory in a highlight window. You get:

- **Loads of Menu Generators**
- **Fast B-tree indexing**
- **Mini-editor with word-wrap**
- **Patch . EXE files**
- **Protected storage areas**
- **Display text files in windows**
- **Julian date routines**
- **Documented BASIC source**

Plus calendars, BCD math routines, clock routines and much more. In addition to the disk and 3-part comprehensive manual, you also get special access to the TOOLKIT SIG on our BBS system where PROBAS programmers from all over the world share their favorite TOOLKIT modules. If you can't call to download new modules, disks of the latest uploads are available. The PROBAS TOOLKIT is an ever-growing product that adds capabilities and helps conserve your most valuable asset of all-- time! ***Just $99.00!***

PROBAS™ TELECOMM TOOLKIT

The TELECOMM TOOLKIT is a collection of high-level communications modules that plug into your code to provide popular file transfer protocols, terminal emulations, auto-dialing, phone data base, login scripts and more. Need to communicate with the world? Plug just the routines you need into your programs.

- **Xmodem/Modem7/Xmodem-1k**
- **Ymodem (single and batch)**
- **CRC-16 and Checksum**
- **VT52, VT100, ANSI BBS etc.**
- **Auto Dialer & data base**
- **Script language support**
- **Full terminal program**
- **Documented BASIC source**

The TELECOMM TOOLKIT. ***Just $75.00!***

HAMMERLY COMPUTER SERVICES, INC.

8008 SANDY SPRING ROAD • LAUREL, MD 20707

(301) 953-2191

or call our BBS at (301) 953-7738

CIRCLE 380 ON READER SERVICE CARD

Manufacturing Company, Inc.

The Experts in Accessories

CURTIS

STORES 50 DISKS

MADE IN U.S.A.

"Best Buy" Only $9.95

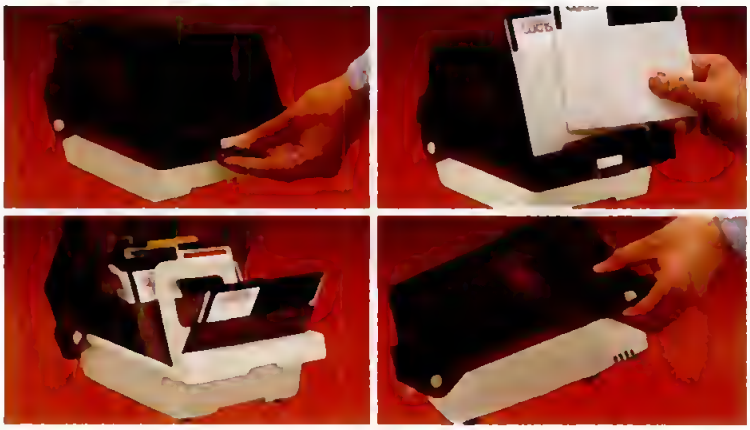
Curtis 5¼ File, 50-Diskette Organizer.

The Curtis 5¼ File protects and organizes up to 50 5¼" diskettes and costs only $9.95. The bronze-tint snap-lock cover protects diskettes and data from harmful dust and debris. Adjustable dividers and color-coded labels let you arrange your diskettes any way you want for easy access.

The Curtis 5¼ File has a special outside shelf for three more working diskettes, a sturdy built-in handle for portability—and the famous Curtis Lifetime Warranty. Keep diskettes clean and organized, find them fast, and keep your desk free of clutter. The Curtis 5¼ File. It's another "Best Buy" from Curtis—the experts in accessories.

Curtis products are available nationally from leading Dealers, Distributors, and Retail Chains.
In Canada: Personal Computer Assoc. Inc., P.O. Box 235, Ajax, ONT, L1S 3C3, (416) 427-6612
For the Curtis dealer nearest you call (603) 532-4123

Bronze-tint snap-lock cover opens easily, keeps diskettes free of dust and debris



Organizes up to 50 5¼" diskettes inside, holds 3 more working diskettes outside. Organizes important data, keeps workspace uncluttered.

Adjustable dividers, plus color-coded labels for customized filing and fast diskette access.

Rugged built-in handle for safe, easy transport of diskettes. Anti-skid foot pads won't scratch your desktop.

One-stop shopping for Innovative Computer Accessories

Manufacturing Company, Inc.
CURTIS
30 Fitzgerald Drive, Jaffrey, NH 03452

Lifetime Warranty

PC MAGAZINE

HELP FILE

Volume 7
Number 13
July 1988

BASICA 3.x Identifiers

This Help File lists standard identifiers for Advanced BASIC 3.x. Some of these commands will not work in Cassette or Disk BASIC, in the BASIC Compiler, or in previous versions of Advanced BASIC.

IBM-compatible computers require their own versions of BASIC, e.g., GW-BASIC. Most of the identifiers listed here will also correspond to these other BASIC versions, but some may not.

SYNTAX: BASICA [*filename*] [<*input*] [>|>>*output*][/F:*files*] [/S:*bsize*] [/C:*combuffer*] [/M:[*max workspace*][,*max blocksize*]] [/D]

filename = BASIC program file to load and run
input = file or device for redirected input
output = file or device for redirected output
files = number of files that can be open at once. Default 3. Maximum is number specified in FILES= line of CONFIG.SYS minus 4.
bsize = buffer size for random files. Default 128 bytes. Maximum 32767 bytes.
combuffer = receive buffer size for communications. Default 128 bytes. Maximum 32767 bytes.
max workspace sets space allocated for BASIC data and stack segments. Default 64K.
max blocksize reserves space for assembly routines above highest location BASIC can address (65536).
/D makes double-precision math functions resident.

BASIC identifiers are variables, functions, statements, and commands. Variables are available for your examination and use. Functions return a value based on zero or more arguments. Statements and commands both perform an action, but in general you use statements within programs and commands in direct mode.

BASIC Functions

Arguments for BASIC functions:
bytenum: A numeric constant, variable, or expression in the range 0..255.
dummy: Dummy numeric argument.
filenum: The number with which the file in question was OPENed.
number: A numeric constant, variable, or expression.
offset: An offset from 0 to 65535 in the current segment. Set the current segment with DEF SEG.
string: A string constant, variable, or expression.

ENVIRON$ — String from BASIC's environment
SYNTAX: ENVIRON$(*string*)—or—ENVIRON$(*n*)
string = name of parameter to be retrieved (case sensitive)
Returns the value of the named parameter.
n = number of parameter to be retrieved (1..255).
Returns both the parameter and its value.

EOF — End of file
SYNTAX: EOF(*filenum*)
Returns -1 (TRUE) if at end of file, 0 (FALSE) if not.

EXP — Exponential operator
SYNTAX: EXP(*number*)

FIX — Truncate number to integer
SYNTAX: FIX(*number*)

FRE — Number of unused bytes in BASIC data area
SYNTAX: FRE(*dummy*)—or—FRE(*string*)
string = a dummy argument. FRE will compress the data area if you use a string variable as the argument.

HEX$ — Convert number to hexadecimal string
SYNTAX: HEX$(*number*)
number = -32768..65535

INP — Read a byte from a port
SYNTAX: INP(n)
n = 0..65535

INPUT$ — Read a string of n characters
SYNTAX: INPUT$(*n*[,[#]*filenum*])
n = number of characters to be read from the file
NOTE: If *filenum* omitted, reads from keyboard.

INSTR — Position of one string in another
SYNTAX: INSTR([*n*],*string1*,*string2*)
n = starting position for search in *string1* (1..255). Default 1.
string1 = string to scan
string2 = string to search for

INT — Convert to integer by rounding down
SYNTAX: INT(*number*)

IOCTL$ — Read control string from device
SYNTAX: IOCTL$([#]*filenum*)
NOTE: Can be used to determine if an IOCTL statement has succeeded or failed.

LEFT$ — Leftmost *bytenum* characters of string
SYNTAX: LEFT$(*string*,*bytenum*)

LEN — Length of string
SYNTAX: LEN(*string*)

LOC — Current position in file
SYNTAX: LOC(*filenum*)

LOF — Length of file
SYNTAX: LOF(*filenum*)

LOG — Natural logarithm
SYNTAX: LOG(*positive number*)

LPOS — Position of printhead in print buffer
SYNTAX: LPOS(*n*)
n = printer number (1..3). 0 also valid for LPT1.

MID$ — Extract part of a given string
SYNTAX: MID$(*string*,*start*[,*length*])
start = 1..255. Character position to begin extracting.
length = 0..255. Number of characters to extract. Default remainder of string.

MKD$ — Convert double-precision to string
SYNTAX: MKD$(*double-precision*)

MKI$ — Convert integer to string
SYNTAX: MKI$(*integer*)

MKS$ — Convert single-precision to string
SYNTAX: MKS$(*single-precision*)

OCT$ — Convert number to octal string
SYNTAX: OCT$(*number*)
number = -32768..65535

PEEK — Read byte from memory
SYNTAX: PEEK(*offset*)

—Neil J. Rubenking

This is the third in a series of Help Files about BASIC.

Manufacturing Company, Inc.

The Experts in Accessories

CURTIS

DIAMOND SP-1
Switched, adapts to duplex outlet; • 6 Outlets, 15 Amps Total 125 Volts, 1875 Watts • Operating Temperature: -40°C to +85°C • Peak Pulse Power Dissipation @ 25°C, 585,000W for 20 Micro Sec • Maximum Clamping Voltage @ Test Current 50A (8/20 Micro Sec.) 340V Clamping Occurs Line to Line (Normal Mode) and Line to Ground (Common Mode) • Clamping Response Time: 1 Nanosecond (1 ×10⁻⁹ sec.) • Dielectric Test: 3000 VAC 60 Sec. • Forward Surge Rating @ 25°C, 1440 Amps for 1/120 Sec. Lifetime Warranty
Retail $49.95

RUBY SPF-2 Switched, EMI-RFI filtered; plugs into duplex outlet; 6 ft. power cord, Built-in Circuit Breaker • 6 Outlets, 15 Amps Total 125 Volts, 1875 Watts • Operating Temperature: -40°C to +85°C Peak Pulse Power Dissipation @ 25°C, 585,000W for 20 Micro Sec. • Maximum Clamping Voltage @ Test Current 50A (8/20 Micro Sec.) 340V Clamping Occurs Line to Line (Normal Mode) and Line to Ground (Common Mode) • Clamping Response Time: 1 Nanosecond (1 ×10⁻⁹ sec.) • Dielectric Test: 3000 VAC 60 Sec. • Forward Surge Rating @ 25°C 1440 Amps for 1/120 Sec • Mode Noise Protection: Normal and Common Mode • Noise Rejection Frequency: 150KHZ–30MHZ • Attenuation: 50B–58DB. Lifetime Warranty
Retail $89.95

EMERALD SP-2 [illegible] plugs into duplex outlet; 6 ft. power cord, Built-in Circuit Breaker • 6 Outlets, 15 Amps Total 125 Volts, 1875 Watts From Single or All Combined • Operating Temperature: -40°C to +85°C • Peak Pulse Power Dissipation @ 25°C [illegible] for 20 Micro Sec. • Maximum Clamping Voltage @ Test Current 50A (8/20 Micro Sec.) [illegible] Clamping Occurs Line to Line (Normal Mode) and Line to Ground (Common Mode) • Clamping Response Time: 1 Nanosecond (1 ×10⁻⁹ sec.) • Dielectric Test: 3000 VAC 60 Sec. • Forward Surge Rating @ 25°C, 1440 Amps for 1/120 Sec., Lifetime Warranty
Retail $59.95

SAPPHIRE SPF-1
Switched, EMI-RFI Filtered, adapts to duplex [illegible] Outlets, 15 Amps Total [illegible] Volts, 1875 From Single or All [illegible] ed • Operating Temperature -40°C to +85°C • Peak Pulse Power Dissipation @ 25°C 585 [illegible] for 20 Micro Sec. • Maximum Clamping Voltage @ Test Current 50A (8/20 Micro Sec.) [illegible] Clamping Occurs Line to Line (Normal Mode) and Line to Ground [illegible] Mode) • [illegible] Response Time: 1 Nanosecond (1 ×10⁻⁹ sec.) • Dielectric Test: 3000 VAC 60 Sec. • [illegible] Surge Rating @ 25°C, 1440 Amps for 1/120 Sec. • Mode Noise Protection: Normal and Common Mode • Noise Rejection Frequency: 150KHZ–30MHZ • Attenuation: 50B–58DB. Lifetime Warranty
Retail $79.95

All Curtis Surge Protectors meet or exceed [illegible] 587-1980 Guide for Surge Voltages [illegible] Power

The Ones To Ask For

Curtis Electronic Surge Protectors are built to provide surge protection for any microcomputer for a lifetime. Constructed with precision, using advanced semiconductor technology, the Curtis Jewels prevent damage to microcomputer systems and data from powerline overvoltage

"surges, spikes and glitches." Surge protection from the Curtis Jewels is your guarantee of the best line of defense for your valuable hardware and data, at a price that won't shock you. Get your computer the protection it deserves with Curtis — the experts in accessories.

Curtis products are available nationally from leading Dealers, Distributors, and Retail Chains.
In Canada: Personal Computer Assoc. Inc., P.O. Box 235, Ajax, ONT, L1S 3C3, (416) 427-6612
For the Curtis dealer nearest you call (603) 924-3823

CSA UL LISTED

Manufacturing Company, Inc.
CURTIS
30 Fitzgerald Drive, Jaffrey, NH 03452

Lifetime Warranty

■ PC LAB NOTES

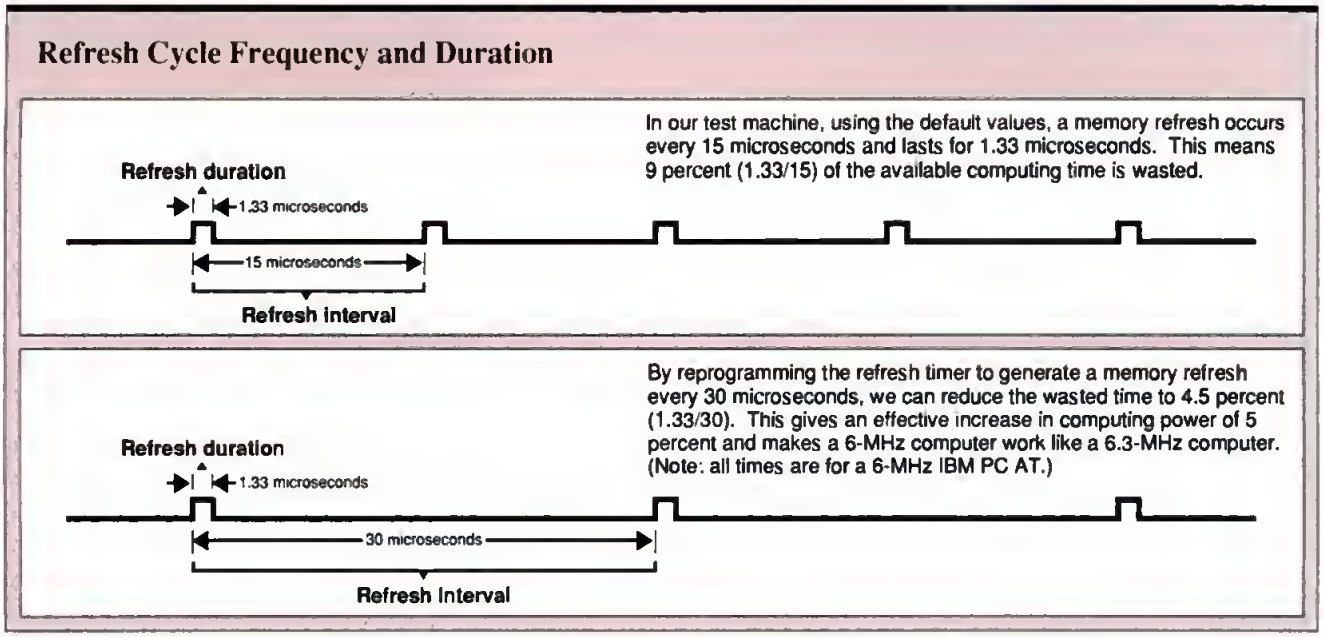


Figure 2: *The efficiency increase available by changing the refresh is easily calculated as illustrated above.*

the value of the countdown timer, and the readings will be constantly changing.)

By storing a new value for Timer 1 of the 8253 Timer chip, we can increase or decrease the time period between refreshes. This is important because the refresh cycle can account for anywhere between 9 and 20 percent of the system overhead. Increasing the amount of time between refreshes gives us proportionately more time for computing, thereby boosting performance. The diagram in Figure 2 shows an example of how this works. By removing some of the system overhead, you can free up more time for the CPU to spend computing and, in turn, run your software noticeably faster.

SETTING THE TIMER When a PC is turned on, one of the first tasks the ROM BIOS performs is to set the refresh cycle timer and test all available system RAM. The procedure leaves the value 12h in I/O register location 41h, which is the location of the 8253 Timer register that controls the refresh frequency rate.

The designers of the PC determined its required refresh cycle by matching the RAM chip manufacturers' average cycle recommendation. This refresh value is based on a theoretical average condition that the manufacturers estimated would be necessary for their DRAMs to operate reliably. But it's common practice in the electronics industry for manufacturers to publish underrated specifications for a chip. This allows the quality of chips to vary slightly while still meeting the specification.

■ It's important to note that the quality of the installed DRAM chips—and whether you're using a PC, XT, or AT—has much to do with how long you can put off refresh.

Because of this conservative approach, it's not unusual to find that the time between refreshes can be substantially increased without any ill consequences. Of course, there *is* a limit to how long we can put off refresh, but it tends to be far beyond the manufacturers' stated maximum.

On one test machine, for example, I was able to stretch the refresh interval from its normal value to 1.001 seconds. This reduces the refresh overhead to less than 0.2 percent and results in an overall performance increase of almost 29 percent! An interval of 1.001 seconds is incredible when you consider that on most PCs the standard refresh cycle is performed once every 15 microseconds.

It's important to note that the quality of the installed DRAM chips—and whether you're using a PC, XT, or AT—has much to do with how long you can put off refresh. It also influences just how much of a boost in performance you'll see. I've done most of my testing on IBM PC ATs and AT compatibles. The CPU speeds and wait states varied. The DRAM chips were made by NEC or Toshiba and were rated at 100- or 120-ns. access time. ATs with 100-ns. RAM and CPUs over 8 MHz tend to show the largest increase in performance. The original IBM PCs may not be able to wait as long between refreshes as ATs, but they will still show a noticeable speedup.

WHAT IF? Going beyond the limit of your system will almost always result in a "PARITY CHECK 1 00000(S)" or "PARITY CHECK 2 00000(S)" error. If

■ PC LAB NOTES

this occurs, you waited too long to refresh, the capacitors lost their charge, and the data just faded away. When this happened, one of the parity chips detected the change in value and signaled the alarm. This type of parity error isn't dangerous and can easily be cured—just turn off the PC, then turn it back on again.

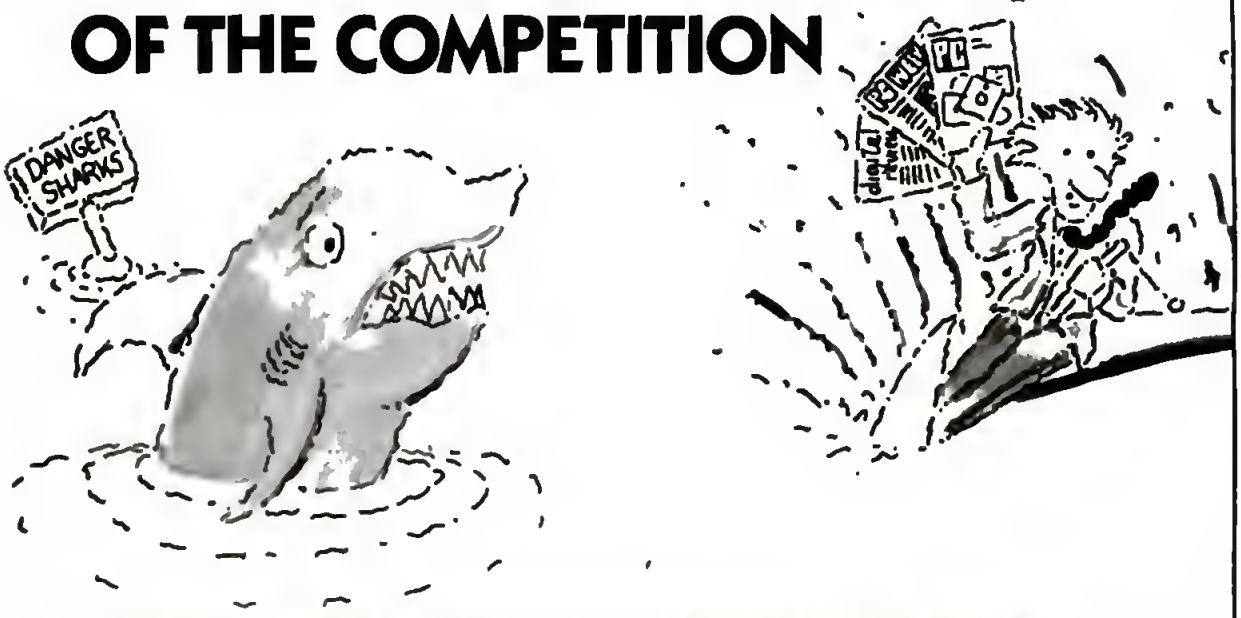
The value stored in the parity chip is calculated every time the system reads or writes to the DRAM. (See the sidebar "Parity Checking.") The PC uses "even" parity. This means that for each byte of storage, the 8 bits of the byte plus the one parity bit assigned to that byte must equal an even number. Parity checking is a crude but effective way for the system to be fairly certain that all data stored in the DRAM is valid. IBM's reason for implementing parity checking was mainly to detect a hardware failure of a RAM chip. When extending the refresh cycle, the parity chip is our safety net and warns us when we have gone a little bit too far.

```
N QFRESH.COM          ;Name = QFRESH.COM
A 100                 ;Start Assembler
MOV AL,74             ;Select Timer #1 for a 16 Bit
OUT 43,AL             ; Number and to count down in binary
MOV AL,LL             ;Insert the low byte value
OUT 41,AL
MOV AL,HH             ;Insert the high byte value
OUT 41,AL
INT 20                ;Exit to DOS
                      ;Stop Assembler's Auto line numbering
R CX                  ;Call CX register
E                     ;Tell how many bytes to write to disk
W                     ;Write the file
Q                     ;Quit DEBUG and exit to a DOS Prompt
```

Figure 3: *The DEBUG script file for QFRESH.COM allows you to experiment with alternative refresh values. See the text for an explanation of the parameters.*

THE QFRESH PROGRAM To experiment with the refresh rate on your machine, you'll need a text editor that can produce pure ASCII files to create the DEBUG script shown in Figure 3. Saving the listing as an ASCII text file will allow us to experiment with various values, without retyping the program each time. (If you

THIS SUMMER, STAY AHEAD OF THE COMPETITION



Give yourself the marketing edge this summer. Keep the competition in your wake by ordering reprints of your product's review from one of Ziff-Davis' leading computer magazines.

Ziff-Davis reprints are custom-designed on 80 pound stock and printed from full color to black and white.

For more information, contact Jennifer Locke—Reprints Manager, Ziff-Davis Publishing Co., One Park Ave., New York, NY 10016, (212) 503-5447, or on MCI Mail. (Minimum order 500 reprints.)

ZD

ANNOUNCING THE FIRST TIMED-RELEASE SOFTWARE.

"Hot product pick of 1988."
PC Resource

Forget-Me-Not, **the first timed-release software,** directs your PC to perform all kinds of tasks...minutes, hours, days, weeks or months into the future.

With this breakthrough program, you predetermine what you want to happen and when. Then, at a precise point in time, *Forget-Me-Not* releases your commands and launches your computer into action.

Just exactly what will *Forget-Me-Not* do? First, it lets you automate all kinds of work (with your computer completely unattended) just by writing timed-release batch files.

Imagine: now you can have your PC print lengthy reports while you're enjoying dinner! You can back up file after file while you're away for the weekend. Download data...and have it printed and waiting for you when you arrive at work in the morning!

With *Forget-Me-Not*, you can also send reminder messages to yourself. It can read your daily appointment calendar from *SideKick*.™ Or you can create reminders from scratch, using your favorite word processor.

This unique product will help you meet deadlines. Divide your time over key projects. Improve your time management skills. Keep others on schedule. Plus, you'll never miss a meeting, birthday or anniversary again!

Forget-Me-Not also adds a new dimension to your electronic mail system. You'll no longer have just two choices: sending mail "now" or "not now." You'll be able to write mail today for delivery while you're out of town next week. Send reminders to everyone working on a project.

Whatever you predetermine, it delivers.

Put *Forget-Me-Not's* power to work for yourself...or for your LAN. The possibilities are as unlimited as your creativity!

System requirements: 100 percent IBM PC compatibility, 128K RAM and DOS 2.0 or greater. IBM is a trademark of International Business Machines. SideKick, Borland International

CIRCLE 319 ON READER SERVICE CARD

It automates: now you can keep your PC working, even when you're not.

It reminds: timed messages keep you on schedule, on deadline, on top of your work.

It networks: your electronic mail is delivered at the precise moment you choose, while you're away for days or weeks.

90-day unconditional money-back guarantee.

CALL NOW: 800/722-7853 (800/323-6406 in CA).

FORGET-ME-NOT™

Introductory offer: save $20. Only $59.95 (reg. $79.95).

Name _____ Phone _____
Address _____
City, State, Zip _____
Add $2 for US shipping ($15 for foreign). In CA: 6.5% tax.
❒ My check (US) or money order is enclosed.
❒ Please bill my: ❒ MasterCard ❒ Visa ❒ Am. Ex.
Card No. _____ Expires _____
Signature _____

Sterling Castle™
702 Washington St., Suite 174
Marina del Rey, Ca 90292

■ PC LAB NOTES

feel comfortable working with DEBUG, you can enter the statements directly.)

If you examine the DEBUG script, you'll see that its first line loads the AL register with 74h. When this value is output to I/O port 43h, it tells the 8253 Mode Control Register to select Timer 1 and to expect a 16-bit number. The refresh timer is now ready for us to program in a new refresh interval. The number is a 16-bit value, but it must be divided into a low byte and a high byte because the I/O register can only accept one 8-bit number at a time.

In the script, there are two labels shown as *LL* and *HH*. These labels represent the low and high byte of the 16-bit number destined for port 41h. *Don't type these labels as shown!* Instead, replace them with the hex numbers that represent the new refresh value. Start out by entering 30 where you see *LL* and 00 where you see *HH*.

Except for the two refresh value labels, type in everything exactly as shown in Figure 3. Be sure to press the Enter key at the end of each line, especially the last one, and to leave a blank line just above the RCX. There is no need to type in the semicolons or the remarks that follow them.

■ You can use the tests in the PC Labs Benchmark Series (available on PC MagNet) to gauge the level of performance gained from QFRESH.

The program should be saved on your disk as an ASCII text file called QFRESH.SCR. Next, make sure DEBUG is in your current directory or in a directory listed in your PATH statement. Then create QFRESH.COM by entering the following command:

```
DEBUG < QFRESH.SCR
```

If you get no error messages, execute the program by entering the command

```
QFRESH
```

A refresh value of *LL*=30 won't cause a parity error on most PCs. You should also notice an increase in performance. Running almost any program will exercise the DRAM enough to cause any potential parity errors to surface. You can use the tests in the PC Labs Benchmark Series (available on PC MagNet) or another performance benchmark program to gauge the level of performance gained. Test programs, which calculate and display CPU speed in megahertz, will probably show a

PARITY CHECKING

In all the members of the IBM PC family (including clone cousins), a row of memory is made up of nine chips. Since memory is allocated in 8-bit bytes, you may wonder what the extra bit in the extra chip is for. That 9th bit is called the *parity* bit, and the data stored in that bit alerts us if an unauthorized change in the RAM occurs.

The bits in the parity chip are controlled by what is called the "74ALS280 Odd/Even Parity Generator/Checker." When a byte is written to memory, by loading a program or performing a calculation, for example, this chip determines whether the total of the bits in the byte is even or odd. If the result is odd, a 1 is stored in the parity bit. If the result is even, a 0 is stored. Because the PC stores the one-digit sum of the byte, the total of all 9 bits will always be even. This condition is known as *even parity*.

Whenever a byte is read, the Parity Generator/Checker recalculates the parity and compares it with the result previously stored in the parity chip's bit. If the two don't match, the dreaded Non-Maskable Interrupt (NMI) is generated and you get a Parity Check Error message on the screen. This process is illustrated in Figure A. When this happens, you have little choice but to turn the machine off until the problem can be corrected.

Parity errors can be caused by various events. The most common cause by far is a machine language program that runs berserk and generates a spurious NMI. In most cases this won't actually corrupt any memory, but the CPU will nonetheless interpret the NMI error as being real. On the other hand, when one or more bits within a RAM chip or supporting circuitry fail, the NMI error is real and has the effect of preventing any further use of the machine.

Parity checking is a very simple form of error detection. It was probably IBM's intention, when designing the PC, to include both parity detection and *correction* facilities to convince distrustful mainframe managers to accept the PC as a viable machine. This would have been nothing new to them. In fact, they had been accustomed to error detection and correction for years. But including a more involved procedure to be able to *correct* certain errors instead of merely reporting the fact would have been much more costly and, thus, lost out in the PC design.

There are quite a few methods for performing error correction. Most are based on fairly complex algorithms, although custom chips are available that will do it automatically. Unfortunately, the methods require more RAM to store the needed extra information.

In retrospect, it is understandable why IBM chose not to include error correction on PCs. The PC was not conceived as a serious business machine, and so no one thought it would ever need more than 640K. Today's "next-generation" PCs (PSs?) will need 3MB of memory just to get OS/2 up and flying. With all that operating system just sitting and waiting in RAM, ready to be corrupted, I think it will be none too soon before error correction becomes mandatory.

—Brian K. Roemmele

reading higher by 0.5 to 2 MHz. Obviously, the CPU's speed hasn't actually changed. Rather, such benchmarks determine the CPU speed by performing a series of calculations. Because the new refresh allows the PC to calculate faster, the benchmark believes your CPU clock speed has increased.

LIVING ON THE EDGE We started out with a relatively safe, low value for *LL*. The larger the *LL* value, the longer the PC will wait between refreshes. With this in mind, you can begin to try new values for *LL*. Try incrementing in steps of 10 or 20. Remember that *LL* is a hex number, and the maximum value is FF. Don't, however, use the value 00. This will produce *no* refresh cycle and a guaranteed parity error.

To experiment with different values, edit the QFRESH.SCR file and change the values of the *LL* and *HH*. Save the program as QFRESH.SCR and assemble again through DEBUG. Once you reach *LL*=FF, keep that value constant and start to increase *HH*. Begin with the *HH*=01 and work your way up.

■ The new refresh allows the PC to calculate faster, making the benchmark believe your CPU clock speed has increased, though it actually hasn't.

At each increment level, run the PC Labs Benchmark Tests and take note of the changes in the readings. At some point there will be no increase in performance, even though you may be a long way from reaching FF. This occurs when the refresh overhead has been decreased by such a large amount that any additional change doesn't produce a noticeable increase in speed. In some cases, *disk* performance will decrease substantially if you go too far beyond your system's optimal setting. Once you find you can increase the value without realizing any further return in performance, go back to the lowest number that created the highest performance. As one final test of your optimum values, leave your PC turned on but inactive for an extended period, say, overnight.

To make your performance increase automatic, enter your system's optimal values permanently in the *LL* and *HH* locations in the QFRESH.SCR file. Once again, use DEBUG to create the .COM file. You can run the final version of QFRESH by entering the name at the DOS

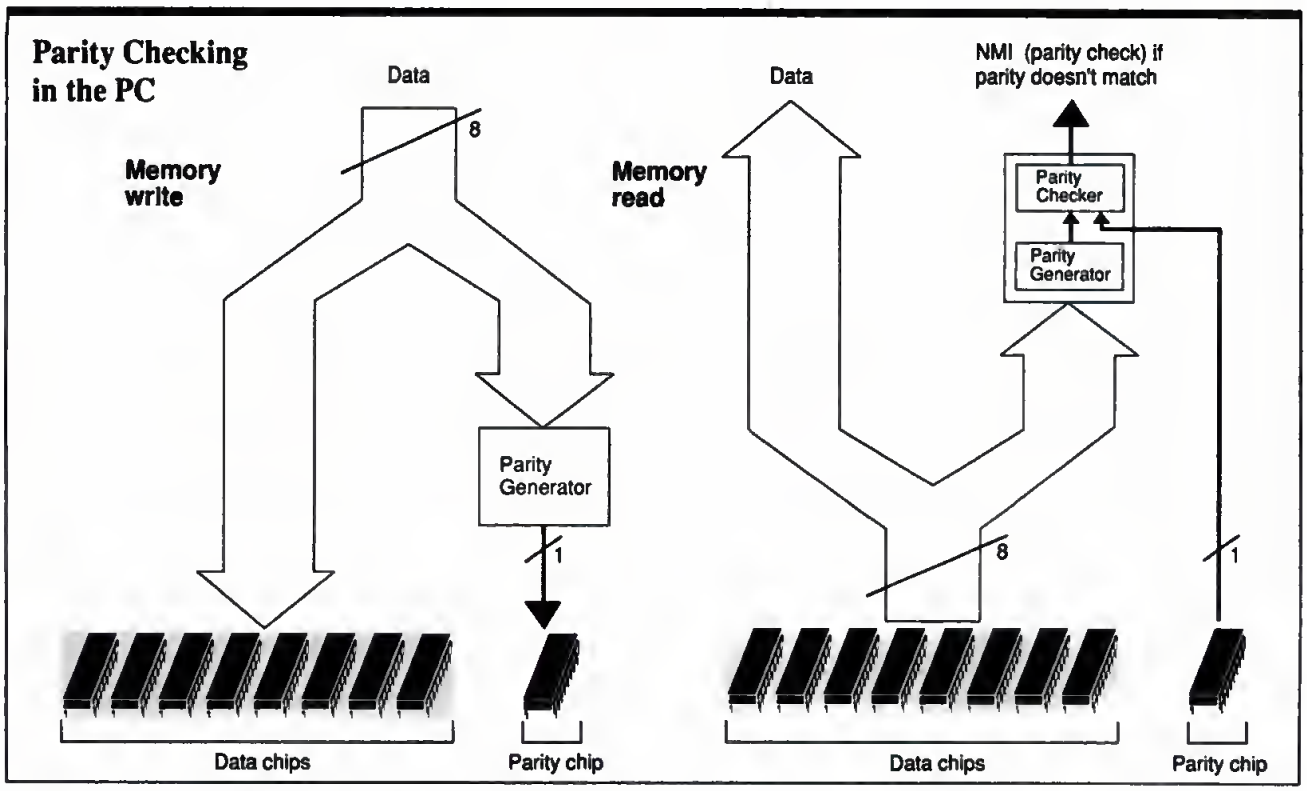
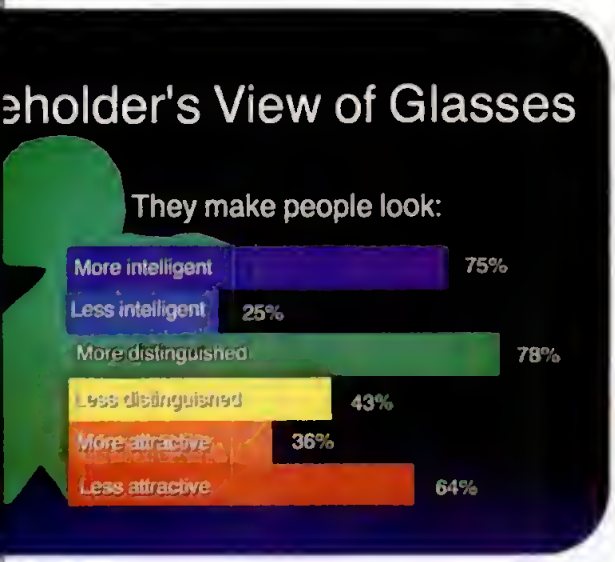


Figure A: *Each time a byte of data is written or read, the Parity Generator/Checker monitors the process.*

The state-of-the-



-art of persuasion.

Today, having a good idea isn't good enough.

You also have to convince other people it's a good idea.

And nothing gives your ideas more power and impact than DRAW APPLAUSE™ from Ashton-Tate.®

It's the state-of-the-art presentation tool for IBM®'s new PS/2™ family and other 286/386 based computer systems. Because its amazing array of graphics capabilities takes you far beyond conventional business charts and graphs. To a whole new level of persuasion.

DRAW APPLAUSE lets you integrate graphics, text and data. Quickly and easily. To produce dynamic overheads. Impactful full-color slides. Impressive printed documents. Everything you need to create winning presentations. Without spending a cent or a minute on outside graphic design services.

DRAW APPLAUSE transforms dull numbers into powerful charts and graphs. At the touch of a key or the click of a mouse. It also lets you integrate text and graphics in seconds. And you can quickly change typefaces, type sizes, and colors to create the exact visual effect you want.

DRAW APPLAUSE also gives you a ready-to-use library of professionally-drawn, full color pictures and graphic images. Everything from a house to a hamburger.

Easy-to-use drawing tools allow you to customize charts and graphs. Or create your own original images. And bring them to life with a choice of over sixteen million colors.

You can also enhance your visuals with some very special, special effects.

Like graduated backgrounds, shadows and halos to make words or images stand out. Everything you need to draw people into your presentation.

DRAW APPLAUSE can also draw on other programs for input. Like Ashton-Tate's dBASE III PLUS™ and PRESENTATION PACK.™ Or Lotus® files and Harvard Graphics.™ You can even import DIF and CGM files.

DRAW APPLAUSE lets you project the most polished professional image possible. With 35mm color slides, overheads or hard copy you can produce yourself. Or we can process and ship to you. All that's required is a modem and our Ashton-Tate Graphics Service.™

For more information about DRAW APPLAUSE or the Ashton-Tate Graphics Service, just call 1-800-437-4329, ext. 207.*

DRAW APPLAUSE from Ashton-Tate.

When it comes to persuasive presentations, it deserves a standing ovation.

ASHTON·TATE®

*In Colorado call (303) 749-4900, Ext. 207. Trademarks/owner: DRAW APPLAUSE, dBASE III PLUS, PRESENTATION PACK, Ashton Tate Graphics Service, Ashton-Tate, Ashton Tate logo/Ashton-Tate Corporation; IBM, PS/2/International Business Machines Corporation; Lotus/Lotus Development Corporation; Harvard Graphics/Software Publishing Corporation. ©1988 Ashton-Tate Corporation. All rights reserved.

■ PC LAB NOTES

prompt or by including it as the last item in your AUTOEXEC.BAT file. And before you trust anything, *be sure to give a trial run to all of your applications* to be sure everything is working as expected.

SLOW IT DOWN What refresh giveth, refresh also taketh away. If you need to *decrease* your system performance, you can put in 00 for *HH* and a value for *LL* in the 01h–11h range into the QFRESH.SCR file. Create QFRESH.COM and rename it SLOWDOWN.COM. Because these values increase the number of refresh cycles, they reduce performance by about 5 to 15 percent. Why would you want to slow down your machine? Well, I can recall at least one occasion when I have saved myself from total insanity. I had a system that kept locking up with intermittent parity errors. The RAM was beginning to go south, but it still had *some* retention left. So I loaded a 01h in the low byte of Timer 1, which decreased the time between refreshes. That made the parity errors disappear long enough for me to finish my project.

■ Before you run QFRESH, be sure to give a trial run to all of your applications to be sure everything is working as expected.

COMPATIBILITY I've tested about 200 of the most popular software packages and have yet to find any incompatibilities. The software usually interprets the new refresh cycle simply as a faster CPU speed. With DOS systems reaching speeds of 25 MHz, most software authors are getting into the habit of not assuming CPU speed. On the hardware side, as I mentioned before, the RAM chips can make a difference. In most cases better quality means better results. All of the expansion cards that I have tested checked out fine with the new refresh. The list ranged from the standard assortment of memory and video cards to exotic zero-wait-state memory boards and network controller cards. I hope you find QFRESH as useful as I have and squeeze out every last drop of performance from your system.

Brian K. Roemmele is the president of Ariel Computer Corp.

TO KEEP YOUR DATA, SAFE: THE BACKUP POWER LINE THAT NEVER BLINKS, BROWNS OR BLACKS OUT.

It is said that knowledge is power. But when the power blinks, browns or blocks out—what do you know?

Without SAFE backup power, you'll drow o blank.

Blonk screen. RAM dota last. Lost files. Moybe far worse.

You might lose o day's work. Or o critical proposal, on hour before presentation. Or all of the dota on your hard disk if it crashes beyond repoir.

That's whot hoppens when your power "blinks" even for just o few milliseconds, for shorter thon the blink of on eye.

If you depend on your PC's or mini's to moke your business run, you should insure your doto ond hardware with SAFE's backup power line. A full line of power protection systems for every PC ond minicomputer opplication.

SAFE's intelligent, battery-powered systems monitor interruptions and respond before you have problems, giving you omple warning ond up to 20 minutes to power down, if needed.

And, SAFE power systems oct os line filters to protect ogainst spikes ond surges. They're olways charged up ond reody—just like o backup power line.

The cost? Starting ot $395 for o PC user. For mini's, under $800.

For more information or your nearest dealer, call (800) 325-5848.

CIRCLE 739 ON READER SERVICE CARD

Software Breakthrough: the RANDOM information processor

New Concept

With all the software tools available, it is surprising that an important need has been overlooked—a way to deal with the countless bits of RANDOM information you spend hours with every day. Tornado will not only give you instant access to this important information ... it will help you make better decisions and even think more clearly. Try Tornado risk-free and discover the productivity software package for your PC that works wonders.

■ Information Windows

With Tornado, you process information in stacks of superfast "intelligent" windows—several on your screen at once. You type into the windows; interconnect and prioritize them; and scan through them in remarkable ways.

■ Free Form

Tornado is FREE-FORM. It works the way you think. To start a new window you just press N, and enter information. No file names. No extra keystrokes. To retrieve information you just press G (for Get), with any word or phrase—you'll watch Tornado zip through your windows like lightning linking and opening those requested. You can even flip through your windows with the arrow keys and watch them instantly pile up and lift away. These are just three of 18 easy but powerful features.

■ Countless Uses

There are thousands of uses for Tornado. When Harry calls you on the phone, in two seconds flat you'll display the six windows on Harry before he finishes his first sentence! No more embarrassing pauses or scrambling for information. Tornado is so versatile you can: write and print a letter faster than ever; track things to do; edit electronic mail; and plan a project or event quickly and easily. You can even build a sophisticated "knowledge" base or an unstructured data base without programming. And that's not all. Track phone conversations, numbers, customers, and all your other RANDOM information. On a portable, Tornado is your ideal moving office. Best of all, you tailor Tornado to your own needs easily!

■ RANDOM Information

Did you ever realize that over half the information you deal with every day is the RANDOM type? Not databases—not spreadsheets—not long documents—but the information scattered around your workplace and in your head. Yet amazingly, until now there was no great software to help you—the tools were either too structured or without organization. But now, at last, there is a quick and easy solution—Tornado—acclaimed by rave reviews and accepted by corporations nationwide. Whether you are a business executive, consultant, engineer, or in any other profession, you need Tornado—it will save you endless time and effort every day—guaranteed -or your money back. Here is how it works:

■ 25,000 Windows

Instead of one window or ten, imagine up to 25,000! It's like extra memory...for your brain! The uses are endless. If you can "type" it—you can "Tornado" it. And because it's memory resident (if you choose) you can quickly jump in from other programs—even move information between them. All this power, yet reviewers agree you can start "Tornado-ing" in 15 minutes—not 15 days.

■ Three Versions

Choose the Tornado that's right for you:
Mini Tornado—$49.95—NEW! Lowest cost version—limited capacity (up to 600 windows and 60,000 characters); does not have: cut & paste, window join, screen grab & put, time & date & sequence stamp, multiple forms, compound searches.

"Excellent Excellent Excellent Excellent"
PC World, Patrick Marshall

"one of the niftiest ... programs I've ever seen."
BYTE, Jerry Pournelle

"Excellent value"
InfoWorld, Review Board

"Editor's Choice"
PC Magazine

Regular Tornado—$99.95—Full version with all commands and full information capacity (up to 25,000 windows and 2,500,000 characters).
Library Tornado—$149.95—All commands, full capacity, plus "Library" of windows containing: free-form year logger, simple project planner, grid maker, city/state/area code/time zone translator, and more templates and references.

■ Productivity Tool

To reach your goals, you need tools that maximize your productivity and help you make your best decisions. Tornado fits the bill perfectly. In fact user surveys show you may well use Tornado more than any other software package! Order today risk-free.

To order call:

(800) 342-5930

Technical questions & NJ: (201) 342-6518
24 hr. modem: (201) 342-8101

☐ **YES,** send me

___Mini Tornado	$49.95
___Regular Tornado	$99.95
___Library Tornado	$149.95

Please add $3.50 to help cover shipping costs ($10 outside USA & Canada). NJ residents add 6% tax. No purchase orders. To order, mail coupon or call (800) 342-5930.
Payment: VISA MC CHECK
Credit Card Expiration _____
Card # _____
Not Copy Protected
30-Day Money-Back Guarantee
Name: _____
Address: _____
_____
City: _____
State: _____ **Zip:** _____
Telephone: _____
☐ 5-1/4" ☐ 3-1/2" disk

MICRO LOGIC CORP.
Dept. T86, 100 2nd St., POB 174
Hackensack, New Jersey 07602

Specifications: FEATURES: free-form & predefined windows, scrolling within window, import & export to files & screens, cut & paste, auto word wrap, time & date stamp, move & join & dup windows, mono or selectable color, definable Hot-key or non-resident, unloadable, LAN support, context help, extended ASCII, smart fully adjustable windows, parallel text processing, progressive resolution and "and-or-not" like searching without keywords, and more **COMPATIBILITY:** IBM-PC XT AT PS2 and compatibles, mono, CGA, 80 col EGA, and Hercules displays. 60K minimum RAM **CAPACITY:** Up to 500 windows and 50K per pile - 50 piles. Not copy protected.

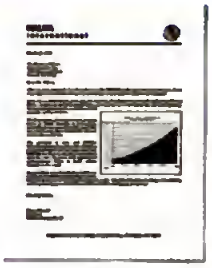
© 1988 Micro Logic. European marketing by Atlantex Inc. (203) 655-6980. Trademarks: IBM-PC XT AT PS2-IBM

Even the greatest perfor improved upon. Introduc

In athletics and in business, if there's one rule that leads to lasting success, it's this: You have to strive constantly to be better. Even when you're known far and wide to be the best.

That's the way it was with WordPerfect® 4.2. We knew we had a winner, but we also knew that we wanted to do even better. And now the day has come.

Introducing WordPerfect 5.0, our greatest achievement to date. WordPerfect 5.0 retains all the advantages and ease-of-use of 4.2, but with important new work-enhancing innovations.



WordPerfect 5.0 is compatible with most popular graphic formats and software programs, including HPGL Plotter and Lotus PIC files. And it allows you to scale, move or rotate most images.

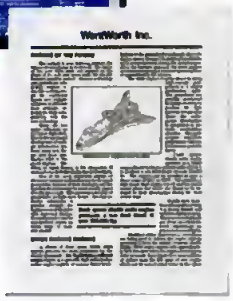
Innovations like integrated text and graphics. WordPerfect 5.0 lets you "illustrate" a point anywhere in your document. So whether you want to place an image in mid-sentence, alongside a paragraph or within a header or footer, the choice is yours.

And WordPerfect 5.0 lets

mances can be ing WordPerfect 5.0.

you create documents containing numerous type fonts and font sizes without having to change your margins, tabs or column definitions. You can also choose whatever typefaces your printer allows—from an assertive, extra-large times roman bold to an elegant, extra-fine italic—and 5.0 makes all the necessary spacing adjustments automatically as you go.

Parallel columns now extend past a page break automatically. And spacing can now be changed within a column.



WordPerfect 5.0's improved Preview feature lets you see what your document will look like before you print.

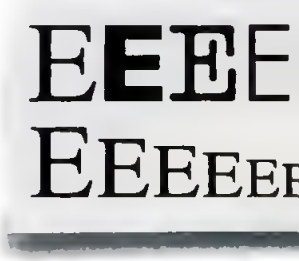
If you're interested in a uniform look—in newsletters, for example—WordPerfect 5.0 has a new Style feature that lets you easily specify the format of your text. Styles are very flexible and can include size and font attributes, text, and other formatting specifications.

And WordPerfect 5.0 offers many other sophisticated advances. Like an improved Preview that shows you what your document will look like before you print; letting you see actual font sizes, proportional spacing and justification. It also lets you zoom in on details, display an entire page of text and graphics at once, or view facing pages together.

There's also the new Master Document feature, which allows you to combine files. So if you're compiling portions of a major proposal or putting together chapters of a book, you can assemble a table of contents and an index, generate references and print the entire document easily.

Additions also include automatic referencing, automatic redline and strikeout, an alternative mnemonic interface, enhanced macro and macro editing capabilities, and improved parallel columns.

Check out all that the new WordPerfect 5.0 has to offer. It's the powerful performer from the company that's produced the number-one selling word processor for over two years running. For more information, write to WordPerfect Corporation, 1555 North Technology Way, Orem, Utah 84057. Or call (801) 225-5000. (In Canada, 1-800-267-2499.)



Typefaces can be mixed at will—up to 250 on a single page, depending on printer capabilities. And print sizes span a wide range.

WordPerfect® Document Processing

Documents shown were printed on a Hewlett Packard LaserJet Series II printer. WordPerfect is a registered trademark of WordPerfect Corporation. All other brand and product names are trademarks or registered trademarks of their respective companies.

CIRCLE 513 ON READER SERVICE CARD

New 4.0 Version!
Now directly import your dBase III files.

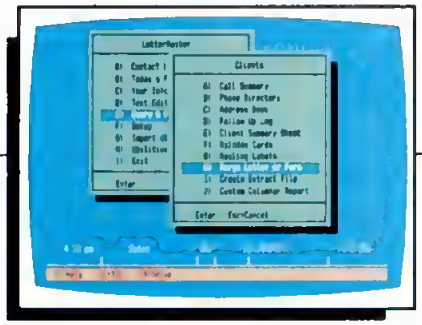
Master your mailings in minutes

LetterMaster™

Client Management / Mail Management

4:30 **"Susan—Send our sales letter to all buyers of apples and cherries in Washington and oranges or bananas in Florida, in time for today's 5:00pm pick-up.—Mr. Wermer."**

4:32 **Mailing lists sorted.**

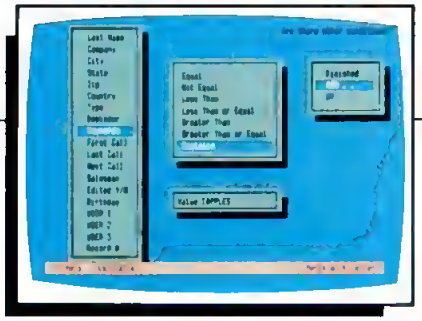


Our new LetterMaster mailing software is a lifesaver. It sorts any list according to any criteria in its own internal database and our dBASE® III files.

4:33 **Lists merged and purged.**

LetterMaster merges lists and purges duplications in a matter of seconds. It's incredible! I can create instant custom mailing lists with a few keystrokes!

4:38 **Personalized sales letters printed.**

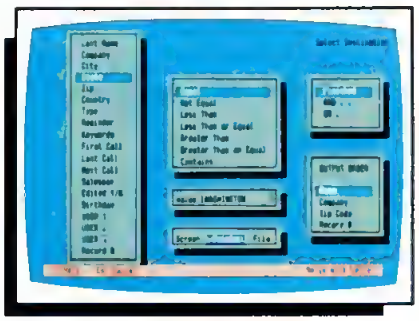


With LetterMaster, all I do is name the list, name the letter, activate the printer, and "go do." It's that simple!

4:41 **Labels printed.**

LetterMaster prints off any list onto leading brand address labels. It prints Rolodex cards and file folder labels, too.

4:45 **Mailing complete and ready for pick-up.**



LetterMaster operates with all the popular word processing programs. About the only thing it doesn't do is lick the envelopes!

System requirements for Single User: DOS 2.1 or higher. IBM PC or your IBM PS2, or 100% compatible. 512K RAM. System requirements for Network Work Station: DOS 3.1 or higher. 640K RAM, any combination of hard, floppy or no disk drives. Trademark/Owners: LetterMaster/Dilg Properties, Inc., dBase III/Ashton-Tate Corp., IBM PC & IBM PS2/International Business Machines Corp., DOS/International Business Machines Corp. and Microsoft Corp.

CIRCLE 348 ON READER SERVICE CARD

5:00 **"Susan—Good work on that mailing.**

Have an apple.—Bob"

Only $149

Multi-user systems: $349.00

LIMITED OFFER CALL FOR OUR FREE DEMO DISK

Research Development Systems, Inc.

1-800-338-9181

☐ Enclosed is my check/money order purchase order
Charge to my ☐ Visa ☐ MasterCard ☐ American Express
☐ Send C.O.D

Credit Card #_____ Expir Date_____

Signature_____

Outside USA add $10.00 per program and make payment by credit card or my bank draft, payable in U.S. dollars drawn on a U.S. bank.

Name_____

Address_____ Phone #_____

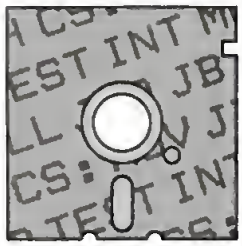
City_____ State_____ Zip_____

Mail to: Research Development Systems, Inc.
PO Box 110216, Arlington, Texas 76007
Dealer inquiries invited.

30 Day Money Back Guarantee

■ UTILITIES ■ TOM KIHLKEN

COMMUNICATIONS AND VIDEO SETUP WITH SETMODE



Configuring your PC through the MODE command is tedious and tricky. Here's a resident utility that makes setting your video mode and communications port parameters easy.

Most PC users leave the chore of setting up their machines to the ever-helpful Someone Else. Thanks to him, they never have to worry about such essential but unlovely details as data bits, stop bits, and video modes. But if Mr. Else ever gets sick and you have to configure anything but a plain-vanilla PC, you'll be glad you've got a program that gives you straightforward, comprehensible choices in place of the arcane syntax of the DOS MODE command.

SETMODE is a memory-resident utility program that gives you complete control over your communications ports and video modes. It provides the most-commonly-needed functions of the conventional MODE command and even provides access to information and features DOS ignores completely. Because it stays resident, you can make subsequent changes at a moment's notice. And since it's menu driven, setting up your system is simple.

The easiest way to get a copy of SETMODE.COM is to download it from PC MagNet, as explained in the sidebar "SETMODE by Modem." If you want to type in the code yourself, the source code (SETMODE.ASM) and a BASIC program (SETMODE.BAS) that will create SETMODE.COM are listed here and are also available via PC MagNet.

USING SETMODE As a resident program, SETMODE must be installed before it can be used. You can do this either by entering

```
SETMODE
```

at the DOS prompt or by entering that command as a line in your AUTOEXEC.BAT file. No parameters are needed. Once installed, you invoke SETMODE by pressing the Alt-M key combination. (A later section in this article will show you how to change the default Alt-M hotkey if you wish.) When you do, a window similar to that shown in Figure 1 will appear on your screen, indicating the current settings of the communications ports and the current video mode. A moving-bar-style cursor will also appear (initially located on the video mode selector), showing the active field.

You use the Plus, Minus, and arrow keys to make any changes desired, and when you hit Enter, the window disappears and the new video mode becomes effective. The display is cleared and the cursor is moved to the top left corner. Because SETMODE does not work through DOS, however, the prompt that was originally on your screen won't be replaced and you'll find yourself staring at a blank screen. Don't be alarmed. Just press Enter once again, and your friendly DOS prompt will reappear. (If you're running a program when you pop up SETMODE, you'll have to perform some program function that up-

Figure 1: *A single keystroke brings up this menu, which lets you configure your system with a simple moving bar.*

■ UTILITIES

dates the screen. It's a good general practice, however, to make mode changes only at the DOS prompt.)

If you press Esc, the window is removed but the video mode will remain unchanged. Any new communications port settings you've made on the screen menu will still go into effect just as if you had hit Enter.

Unlike many pop-up utilities, SETMODE is equally at home in graphics or in text modes. It does need to make slight adjustments, however. You'll notice its normal double-line border is replaced with a row of asterisks when you change into a graphics mode. This is because not all display adapters have the necessary screen fonts for the line characters in graphics modes. The display may also appear in different colors, depending on what type of adapter and display you're using. You'll also notice that the moving bar won't be visible in the three monochrome graphics modes (6, 15, and 17). When in these modes, you'll simply have to look at the numerical display indicator in the lower window to select a mode, moving from one to the other with the Left or Right Arrow key. Remember that the mode you select won't become obvious until you press Enter twice: once to effect the command, and again to return your DOS prompt.

VIDEO MODES Which modes are available depends on what adapter(s) and monitor(s) are installed in your system. If you've got a modest system with only a monochrome adapter and display, you'll have to be content with mode 7. With one of IBM's proud new VGA displays, you can pick from any of 15 available modes. A table of the modes supported by other adapters is shown in Figure 2. SETMODE automatically determines which modes are available for you and restricts your selections to the valid modes. (If you're wondering what happened to modes 8 through 12, they're reserved for the PC*jr* and for performing several internal EGA functions.)

The most common modes are 3 for color text and 7 for monochrome text. Most programs can run only in these modes. If you inadvertently switch to one of the graphics modes and then run a text-oriented program (such as a word processor), don't be surprised if your display switches back to a text mode. Well-written software that can't operate in graphics wisely adjusts the display during its initialization. If a program skips this vital step, it will likely display garbage on the screen.

If your system has more than one display card installed, SETMODE can switch the active adapter for you. The monochrome display can use modes 7 and 15. All other modes require a color monitor.

When browsing through the available video modes, you'll be able to see the available resolution with each mode in the window. For text modes, this is the number of rows and columns (some EGAs can display more than the nominal number of characters). For graphics modes, the number of picture elements (pixels) is given. The initial mode is indicated by an arrow at the bottom of the lower window. If you don't want to disturb the display, be sure to return to this mode before pressing Enter. Remember that when the mode is changed, the screen will be cleared.

To harness the full capability of your EGA or VGA display system, you'll want to combine SETMODE with a color program such as SPECTRUM (see PC Lab Notes, June 23, 1987). With this duo, you'll have the power you need to experiment with more color options than DOS ever expected.

One limitation of SETMODE will become apparent when the program is activated in a graphics mode. Although the original text is restored, any graphics (such as a pie chart or picture) are lost. SETMODE can save only the underlying character data. In fact, you'll notice further that the text is always restored in black and white. Although it would be theoretically possible to correct this problem, the wide variety of graphics modes would have made the resulting code extremely complex. Further, a very large amount of memory would have been required to save graphics images, and it's important for resident programs to use as little memory as possible. Character data is always preserved, however, even in graphics mode.

THE SERIAL PORTS In addition to switching video modes, the communication port protocol can be initialized or changed with SETMODE. When the pro-

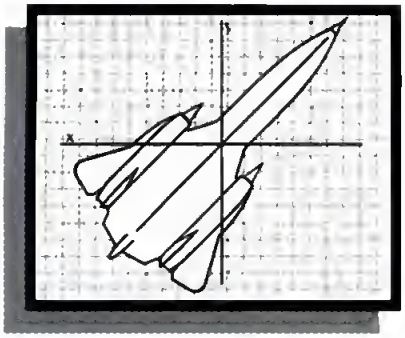
Video Adapters and Supported Modes

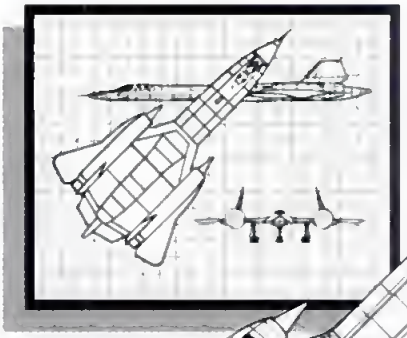
Mode		VGA	MCGA	EGA (color monitor)	EGA (mono monitor)	CGA	MDA
0	text	●	●	●	○	●	○
1	text	●	●	●	○	●	○
2	text	●	●	●	○	●	○
3	text	●	●	●	○	●	○
4	graphics	●	●	●	○	●	○
5	graphics	●	●	●	○	●	○
6	graphics	●	●	●	○	●	○
7	text	●	○	○	●	○	●
13	graphics	●	○	●	○	○	○
14	graphics	●	○	●	○	○	○
15	graphics	●	○	○	●	○	○
16	graphics	●	○	●	○	○	○
17	graphics	●	●	○	○	○	○
18	graphics	●	○	○	○	○	○
19	graphics	●	●	○	○	○	○

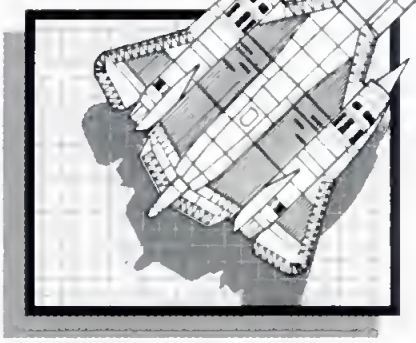
●—Yes ○—No

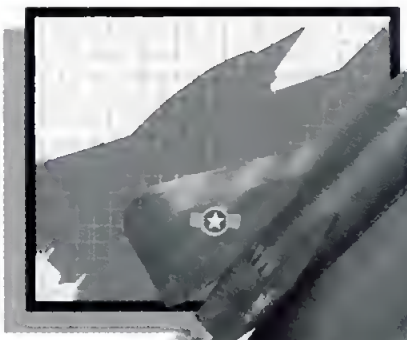
Figure 2: *Not all video modes are available with every display adapter. Here are the combinations that will work.*

At only $299, DesignCAD is the simplest way to get some very sophisticated results.









You can spend thousands of dollars for a CAD software package without getting the kind of power and performance that DesignCAD delivers for only $299...complete! With the DesignCAD's easy-to-use, easy-to-learn single keystroke commands, you'll be producing ultra-sophisticated results in no time at all.

The Features You're Looking For

The options you normally have to purchase separately with other CAD programs, aren't options with DesignCAD. They're built in.

- Expanded Memory Support
- Selection of Character Fonts
- Symbol library with over 500 symbols
- Bill of Materials utility
- Finest curve fitting in the industry
- Extensive snap features
- True Auto Dimensioning with several formats
- Extensive layering features
- Full zoom, pan and rotate capabilities
- And many other features

In addition, DesignCAD's extensive file transfer utilities allow you to read and write different formats. DesignCAD allows you to: transfer documents to and from IGES, DXF, HPGL, transfer to GEM and Postscript, and to read ASCII text files and X,Y Coordinate files.

DesignCAD re-defines Compatibility

Virtually any printer, plotter or graphics adapter compatible with IBM PC is compatible with DesignCAD. DesignCAD is also compatible with most other CAD systems, large and small.

For all of the capability, compatibility and ease-of-use you need in a CAD system, get DesignCAD — only $299! See your local computer dealer, or contact:

American
Small Business Computers, Inc.
327 S. Mill St., Pryor, OK 74361
(918) 825-4844 FAX 918-825-6359
Telex 9102400302

Call or write for a detailed brochure and a free demo disk.

CIRCLE 475 ON READER SERVICE CARD

■ UTILITIES

```
;-----------------------------------------------------------------
; SETMODE is a resident program which allows you to set the video mode
; and the communication port protocol.  PC Magazine July, 1988
;-----------------------------------------------------------------
; BIOS_SEG is the ROM-BIOS data area
;-----------------------------------------------------------------
BIOS_SEG        SEGMENT AT 0040H
                ORG     0010H
EQUIP_FLAG      DW      ?
                ORG     0049H
CRT_MODE        DB      ?
COLUMNS         DW      ?               ;Current number of columns
                ORG     0050H
CURSOR_POSN     DW      8 DUP(?)        ;Current cursor location
                ORG     0062H
ACTIVE_PAGE     DB      ?               ;Active page for CGA and EGA
                ORG     0084H
ROWS            DB      ?               ;Last row number for EGA
                DW      ?
EGA_INFO        DB      ?
BIOS_SEG        ENDS

CSEG            SEGMENT
                ASSUME  CS:CSEG, DS:CSEG, ES:CSEG
                ORG     0100H           ;Beginning for .COM program
START:          JMP     INIT_ALIZE      ;Initialization code is at end

;-----------------------------------------------------------------
; Data area used by this program
;-----------------------------------------------------------------
HOTKEY          EQU     32H             ;Scan code for "M" key
SHIFT_MASK      EQU     0020H+4000H     ;Mask for ALT key
CR              EQU     13
LF              EQU     10

COPYRIGHT       DB      "SETMODE 1.0 (c) 1988 Ziff Communications Co."
                DB      CR,LF,"PC Magazine ",254," Tom Wihlken"
                DB      CR,LF,"Hotkey is Alt-M$",1AH
INSTALLED_MSG   DB      CR,LF,"Already Installed$"

WINDOW_TEXT     DB      2, 1,"SETMODE 1.0    "
                DB      24,12,25,32,26,32,27," + -  <CR> Esc",0
                DB      4, 4,"COMMUNICATION PORTS",0
                DB      2, 5,"Port:",0
                DB      16,5,"1",0
                DB      23,5,"2",0
                DB      30,5,"3",0
                DB      37,5,"4",0
                DB      2, 6,"Bps:",0
                DB      2, 7,"Parity:",0
                DB      2, 8,"Data bits:",0
                DB      2, 9,"Stop Bits:",0
                DB      2,10,"DSR:",0
                DB      4,3,"DISPLAY",0
                DB      4,4,"Mode:",0
                DB      2,5,"0 1 2 3 4 5 6 7 13 14 15 16 17 18 19",0,0

COUNTER1        DW      ?
COUNTER2        DW      ?
BIOS_FLAG       DB      0
COLORS          LABEL   WORD
NORMAL          DW      ?
INVERSE         DB      ?
OLDINT09        DD      ?
LEFT_SIDE       DW      ?
MODE_SELECT     DB      ?
GRAPH_TEXT      DB      ?
ITEM_SELECT     DW      0
PORT_SELECT     DB      0
PORT_ADDRESS    DW      ?
ADAPTER_FLAGS   DW      ?
ADAPTER_TABLE   DB      56,56,56,56,56,56,56,56,25,00,00,00,00,00,28,28
                DW      24,28,40,16,40
EQUIP_TABLE     DW      16,14,32,32,32,32,32,32,40,00,00,00,00,00,14,16
                DW      40,16,32,32,32

;-----------------------------------------------------------------
; This is the main routine of the resident portion of the code
;-----------------------------------------------------------------
SETMODE         PROC    NEAR
                ASSUME  CS:CSEG, DS:CSEG, ES:BIOS_SEG
                CALL    GET_CURS_ADDR   ;Cursor address for this page
                PUSH    BX[BX]          ;Save the cursor location
                MOV     AL,BS:CRT_MODE  ;Get current mode
                AND     AL,00111111B    ;Mask the high bit
                MOV     MODE_SELECT,AL  ;Store the initial video mode

                MOV     GRAPH_TEXT,1
                MOV     BX,7007H        ;Colors for mono mode
                CMP     AL,07H          ;Is mono text mode?
                JE      NOT_COLOR_TEXT
                MOV     BX,0503H        ;Colors for graphics modes
                MOV     GRAPH_TEXT,0
                CMP     AL,3            ;Is CGA text mode?
                JA      NOT_COLOR_TEXT
                MOV     GRAPH_TEXT,1
                MOV     BH,EGIACTIVE_PAGE
                MOV     AH,8            ;Read current colors
                INT     10H             ;BIOS read char/attribute
                MOV     BL,AH           ;Foreground color
                MOV     BH,AH           ;Background color
                XOR     BH,11101111B    ;Flip the color bits
NOT_COLOR_TEXT:
                MOV     COLORS,BX
                MOV     DI,OFFSET WINDOW_BUFFER
                MOV     DL,BS:COLUMNS   ;Compute center of screen
                SUB     DL,40           ;We'll use 40 columns
                SHR     DL,1            ;Divide by two
                MOV     LEFT_SIDE,DL    ;This is column for left edge

                XOR     DH,DH           ;First window in row 0
                MOV     COUNTER1,1
                CALL    OPEN_WINDOW     ;Open top window
                MOV     COUNTER1,6
                CALL    OPEN_WINDOW     ;Open middle window
                MOV     COUNTER1,3
                CALL    OPEN_WINDOW     ;Open bottom window
                MOV     SI,OFFSET WINDOW_TEXT
TEXT_LOOP:
                LODSW                   ;Fill in window text
                OR      AL,AL
                JZ      TEXT_DONE       ;Is this the last string yet?
                MOV     DX,AX           ;Get row/column for this string
                ADD     DL,LEFT_SIDE    ;Add in left edge of window
                CALL    TTY_STRING      ;Put up the string
                JMP     TEXT_LOOP       ;Loop for all text strings
TEXT_DONE:
                CMP     ES:CRT_MODE,19  ;Is this mode 0-19?
                JA      GET_A_KEY       ;If not, can't point to it
                CALL    VIDEO_COLUMN    ;Get column for current mode
                INC     DL
                MOV     DH,16
                MOV     AL,30           ;ASCII for up carrot
                CALL    DISPLAY_NORMAL  ;Pointer to current mode
GET_A_KEY:
                CALL    SHOW_PORTS      ;Display comm port status
                CALL    SHOW_MODE       ;Display video info
                MOV     CH,INVERSE
                CALL    REV_BAR         ;Reverse video for selected item
                XOR     AH,AH
                INT     16H             ;Read a keystroke
                PUSH    AX              ;Save the keystroke
                MOV     CH,NORMAL
                CALL    REV_BAR         ;Turn off reverse bar
                POP     AX              ;Get back the keystroke

                CMP     AH,48H          ;Is it up arrow ?
                JNE     NOT_UP
                CMP     WORD PTR ES:[0080],0 ;Is there a COMM1?
                JZ      GET_A_KEY       ;If not, don't go up
                DEC     ITEM_SELECT     ;Move up to next item
                JNS     GET_A_KEY
                MOV     ITEM_SELECT,4
                JMP     GET_A_KEY       ;And get another keystroke
NOT_UP:
                CMP     AH,50H          ;Is it down arrow?
                JNE     NOT_DOWN
                INC     ITEM_SELECT     ;Move down to next item
                CMP     ITEM_SELECT,4
                JBE     GET_A_KEY
                MOV     ITEM_SELECT,0
                JMP     GET_A_KEY
NOT_DOWN:
                CMP     AH,4DH          ;Is it right arrow?
                JNE     NOT_RIGHT
                MOV     AL,1            ;Indicate moving to right
                CALL    SIDEWAYS        ;And move the bar
NOT_RIGHT:
                CMP     AH,4BH          ;Is it left arrow?
                JNE     NOT_LEFT
                MOV     AL,-1           ;Indicate moving to left
                CALL    SIDEWAYS        ;And move the bar
NOT_LEFT:
                CMP     AL,"+"          ;Is it the plus key?
                JNE     NOT_PLUS
                MOV     CL,1            ;Indicate increasing value
                JMP     CHG_COMM
NOT_PLUS:
                CMP     AL,"-"          ;Is it the minus key?
                JNE     NOT_MINUS
                MOV     CL,-1           ;Indicate decrease value
                JMP     CHG_COMM
NOT_MINUS:
                CMP     AH,1            ;Is it escape?
                JE      ESC_OUT
                CMP     AL,13           ;Is it carriage return?
                JE      EXIT_OUT
                JMP     GET_A_KEY       ;Ignore any other keys
ESC_OUT:
                MOV     AL,ES:CRT_MODE  ;Get starting video mode
                MOV     MODE_SELECT,AL  ;Make it the selected mode
EXIT_OUT:
                XOR     DH,DH           ;Restore the window
                MOV     SI,OFFSET WINDOW_BUFFER
ROW_LOOP:
                MOV     CX,40           ;Do all 40 columns
                MOV     DL,LEFT_SIDE
COL_LOOP:
                LODSW
                CALL    DISPLAY_CHAR
                LOOP    COL_LOOP        ;Loop for each column
                INC     DH              ;Move to next row
                CMP     DH,18
                JNE     ROW_LOOP        ;Loop for each row
                CALL    GET_CURS_ADDR   ;Get cursor address for this page
                POP     ES:[BX]         ;Restore original cursor position

                MOV     BL,MODE_SELECT  ;Get starting video mode
                CMP     BL,ES:CRT_MODE  ;Has it changed?
                JE      SAME_MODE       ;If not, just return
                XOR     BH,BH
                MOV     CL,BQUIP_TABLE[BX]
                MOV     AH,ES:EQUIP_FLAG
                AND     AL,11001111B    ;Erase old video settings
                OR      AL,CL           ;Set new video equipment bits
                MOV     BS:EQUIP_FLAG,AX;Write new equipment word
                MOV     AX,BX
                INT     10H             ;Reinitialize video adapter
                MOV     AH,2
                XOR     DX,DX           ;Put cursor at home
                XOR     BH,BH           ;For page zero
                INT     10H             ;BIOS set cursor function
SAME_MODE:
                RET
SETMODE         ENDP
```

(continues)

SETMODE.ASM: *The assembly language source code for SETMODE.COM.*

CrystalPrint™

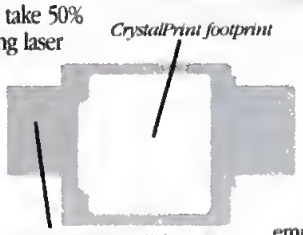
The Most Personal Page Printer Since the Ballpoint Pen.

Personal

Small. Lightweight. Fast. Quiet. As convenient and affordable as your personal computer. That's why you should investigate the CrystalPrint family of page printers today.

Personal Size

CrystalPrint page printers take 50% less space than the leading laser printer. And they weigh 30% less. That means they can be desktop close, even when space is precious.



Personal Productivity

CrystalPrint Series II™ and CrystalPrint WP™ page printers put six pages within arm's reach in a minute. There's no waiting. No ear-shattering noise. No traipsing around the office to a shared printer. Even the paper tray is conveniently front-loading to make you more efficient.

Professional Performance

CrystalPrint Series II gives you full HP LaserJet Series II™ emulation and fonts. CrystalPrint WP comes with Qume/Diablo emulation. HP or Epson emulation for presentation graphics and desktop publishing is optional. Other emulation and font cartridges are available for both models. And both use a reliable liquid crystal shutter print engine to deliver crisp, clear text and graphics — print quality that rivals the most expensive page printers on the market, but at a much lower cost.

Personal Price

Here's the best part. At $1999* for the CrystalPrint Series II and just $1299* for the CrystalPrint WP, page printing is now closer to you than ever before, and as convenient as — well, reaching for your ballpoint.

For the location of the nearest CrystalPrint dealer, reach for your telephone, right now, and call (408) 988-5149.

Dealer inquiries invited. See how the CrystalPrint dealer program can benefit you.

DATA TECHNOLOGY CORPORATION

Setting New Standards™

2551 Walsh Avenue, Santa Clara, California 95051

Laserjet Series II, Epson, Diablo, and Qume are registered trademarks of their corporations or institutes. *Suggested retail price

©Data Technology Corporation, 1988

CIRCLE 152 ON READER SERVICE CARD

When our engineers developed the first 2 MB diskette, some major projects had to be put on hold.

Unmowed lawns. Overgrown gardens. And unpainted fences. It wasn't pretty.

But, being the first company in the world to introduce the 2 megabyte diskette was worth it. According to our engineers.

Six years and many, many weekends of hard work finally paid off.

In March, 1987, history was made. We introduced a 3.5 inch diskette that could hold twice as much information as any other diskette for specific systems.

Its performance redefined

© 3M | 988

the word precision. Its reliability and durability were legend.

In short, it was the ultimate 3.5 inch diskette.

But that still wasn't good enough.

That's why to this day, our engineers are still hard at work. On diskettes. Data cartridges. And other forms of magnetic media. Every day. Every weekend. Trying to improve. Reinvent. And make history all over again.

So, until then, you'll just have to settle for state of the art.

And hope you're not one of their neighbors.

For more information, call 800-888-1889, Ext. 75.

Supporting the dream.

3M

Worldwide Sponsor 1988 Olympic Games

CIRCLE 267 ON READER SERVICE CARD

■ UTILITIES

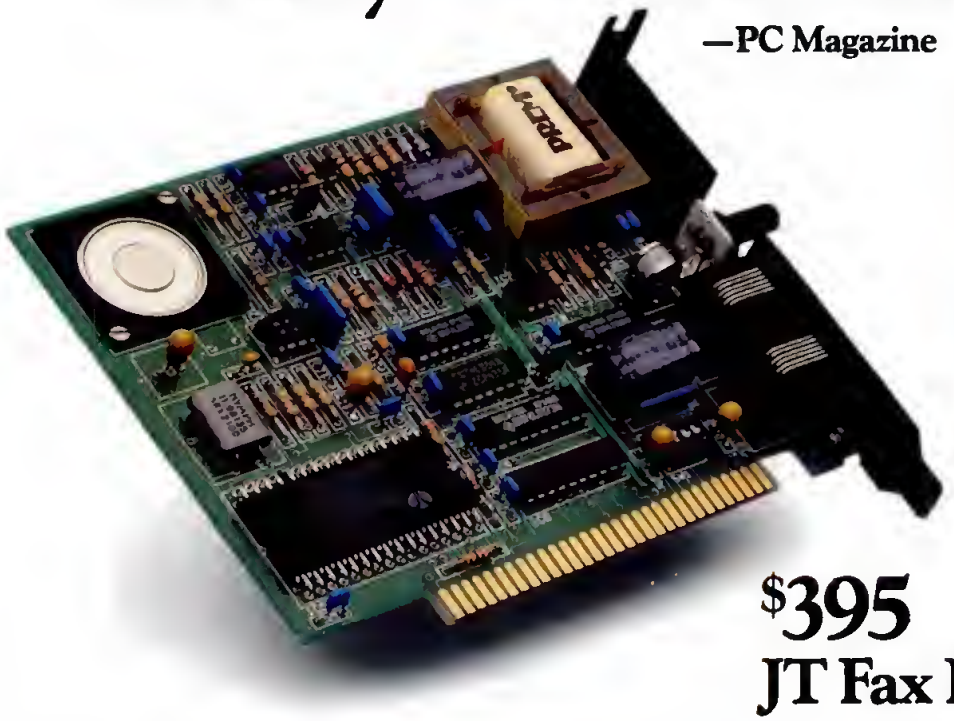
```
;--------------------------------------------------------------------
; Sideways moves the moving bar left and right
;--------------------------------------------------------------------
SIDEWAYS        PROC    NEAR
                ASSUME  CS:CSEG, DS:CSEG, ES:BIOS_SEG
                CBW     ITES_SELECT,0   ;Doing video modes?
                JE      CHG_MODE        ;If yes then change the mode
                MOV     BL,PORT_SELECT  ;Get comm port number
                ADD     BL,AL           ;Move to next port
                MOV     PORT_SELECT,BL
                CMP     BL,3            ;Maximum of 3 ports
                JA      SIDEWAYS

                XOR     BH,BH
                SHL     BX,1
                CMP     WORD PTR ES:[BX],0 ;Is there a card installed?
                JZ      SIDEWAYS        ;If no card move to next
                RET
CHG_MODE:
                CMP     ADAPTER_FLAGS,0
                JE      UNKNOWN_ADAPTER
                MOV     BL,MODE_SELECT  ;Get current mode
                ADD     BL,AL           ;Move to next one
                MOV     MODE_SELECT,BL
                CMP     BL,19           ;Last mode is number 19
                JA      CHG_MODE
                XOR     BH,BH
                MOV     CL,ADAPTER_TABLE[BX]
                AND     CL,ADAPTER_FLAGS ;Is this adapter installed?
                JZ      CHG_MODE        ;If not, use next mode
UNKNOWN_ADAPTER:
                RET
SIDEWAYS        ENDP

;--------------------------------------------------------------------
; CHG_COMM changes the parameters of the serial ports
;--------------------------------------------------------------------
CHG_COMM        PROC    NEAR
                ASSURE  CS:CSEG, DS:CSEG, ES:BIOS_SEG
                MOV     BL,PORT_SELECT  ;Look at current port
                XOR     BH,BH
                SHL     BX,1
                MOV     DX,ES:[BX]      ;Get the card address
                ADD     DX,3            ;Point to line control
                MOV     AH,ITES_SELECT
                DEC     AH              ;Changing baudrate?
                JZ      CHG_BAUD
                DEC     AH              ;Doing parity change?
                JZ      CHG_PARITY
                DEC     AH              ;Changing data bits
                JZ      CHG_DATA_BITS
                DEC     AH              ;Changing stop bits
                JZ      CHG_STOP_BITS
                JMP     GET_A_KEY
CHG_BAUD:
                CALL    READ_SET_BPS    ;Read current baudrate
                CMP     CL,1
                JNE     LOWER_BAUD      ;Going up?
                CMP     BX,3            ;At 38400 bps?
                JNE     SHIFT_DOWN
                IRC     BZ              ;This is to get 57600 bps
SHIFT_DOWN:
                SHR     BX,1            ;Divide by two for new rate
                OR      BX,BX           ;Is divisor zero yet?
                JNE     SET_NEW_BAUD
                MOV     BX,384          ;Divisor for 300 bps
                JMP     SHORT SET_NEW_BAUD
LOWER_BAUD:
                SHL     BX,1            ;Times two for new rate
                CMP     BX,4            ;At 28800 bps?
                JNE     SHIFT_UP
                DEC     BZ              ;This is to get 38400 bps
SHIFT_UP:
                CMP     BX,384          ;At 300 bps yet?
                JBE     SET_NEW_BAUD
                MOV     BX,1            ;Set divisor to 1
SET_NEW_BAUD:
                CALL    READ_SET_BPS    ;Set the new value
                JMP     GET_A_KEY       ;And get another keystroke
CHG_PARITY:
                IN      AL,DX           ;Get current parity bits
                MOV     AL,AL
                AND     AL,11000111B    ;Erase old parity bits
                RRR     BL,1            ;Shift parity bits over
                SSS     BL,1
                RRR     AL,1
CHG_AGAIN:
                ADD     BL,CL           ;Add in the change
                AND     BL,00000111B
                TEST    BL,00000001B
                JNE     PARITY_OK
                TEST    BL,00001110B
                JNZ     CHG_AGAIN       ;Skip nonsingless settings
PARITY_OK:
                SHL     AL,1            ;Move parity bits back left
                SSL     BL,1
                SRL     BL,1
                OR      AL,AL           ;Replace other startlog bits
                JMP     SHORT CHG_COMM_RET
CHG_DATA_BITS:
                IN      AL,DX           ;Get line control register
                MOV     AR,AL           ;Save original line control
                ARD     AH,11111100B    ;Mask out old data bits
                ADD     AL,CL
                AND     AL,00000011B    ;These are the new data bits
                OR      AL,AH           ;Put back other starting bits
                JMP     SHORT CHG_COMM_RET
CHG_STOP_BITS:
                IN      AL,DX           ;Get line control register
                XOR     AL,00000100B    ;Toggle the stop bit flag
CHG_COMM_RET:
                OUT     DX,AL           ;Set new line status
                JMP     GET_A_RET
CHG_COMM        ENDP

;--------------------------------------------------------------------
; REV_BAR turns the moving bar off and on
;--------------------------------------------------------------------
BAR_SIZE        DB      8,6,5,1,1
```

```
REV_BAR         PROC    NEAR
                ASSUME  CS:CSEG, DS:CSEG, ES:BIOS_SEG
                MOV     DH,ITES_SELECT  ;Get selected item
                OR      DH,DH           ;Are we in video mode now?
                JZ      DOING_VIDEO     ;If yes then use video bar

                MOV     BL,DS           ;AL has item number
                XOR     BH,BH
                MOV     CL,BAR_SIZE[BX] ;Get size of this bar
                ADD     CH,5
                MOV     AL,7
                MUL     PORT_SELECT
                ADD     AL,17
                SUB     AL,CL
                ADD     AL,LEFT_SIDE
                MOV     DL,AL
REV_LOOP:
                CALL    READ_CHAR       ;Read current char at this position
                MOV     AH,CH           ;Change the attributs
                CALL    DISPLAY_CHAR    ;Then write the character again
                DEC     CL
                JNZ     REV_LOOP
DONT_SHOW_IT:
                RET
DOING_VIDEO:
                CMP     MODE_SELECT,19  ;Is this mode in normal range
                JA      DONT_SHOW_IT    ;If not, just skip it
                CALL    VIDEO_COLUMN    ;Find column for this mode
                MOV     DH,15           ;Video is on row 15
                MOV     CL,2            ;Size of bar is two columns
                JMP     REV_LOOP
REV_BAR         ENDP

;--------------------------------------------------------------------
; VIDEO_COLUMN returns the column position for the selected video mode
;--------------------------------------------------------------------
COLUMN_DATA     DB      1,3,5,7,9,11,13,15,0,0,0,0,0,18,21,24,27,30,33,36
VIDEO_COLUMN    PROC    NEAR
                ASSUME  CS:CSEG, DS:CSEG, ES:BIOS_SEG
                MOV     BL,BODE_SELECT  ;Get selected mode
                XOR     BH,BH
                MOV     DL,COLUMN_DATA[BX]
                ADD     DL,LEFT_SIDE    ;Add in column of left side
                RET
VIDEO_COLUMN    ENDP

;--------------------------------------------------------------------
; OPEN_WINDOW draws a box with the double line border
;--------------------------------------------------------------------
OPEN_WINDOW     PROC    NEAR
                ASSUME  CS:CSEG, DS:CSEG, ES:NOTHING
                OR      DH,DH
                JZ      TOP_LINE
                MOV     AL," "
                MOV     CX," "*256+" "
                CALL    OPEN_LINE       ;Open a blank line
TOP_LINE:
                MOV     AL,201
                MOV     CX,187*256+205
                CALL    OPEN_LINE       ;Top line
WIN_LOOP2:
                MOV     AL,186
                MOV     CX,186*256+" "
                CALL    OPEN_LINE       ;Middle lines
                DEC     COUNTER1
                JNE     WIN_LOOP2
                MOV     AL,200
                MOV     CX,188*256+205
                CALL    OPEN_LINE       ;Bottom line
                RET
OPEN_WINDOW     ENDP

;--------------------------------------------------------------------
; OPEN_LINE is used by OPEN_WINDOW to create one row of the window
;--------------------------------------------------------------------
OPEN_LINE       PROC    NEAR
                ASSUME  CS:CSEG, DS:CSEG, ES:BIOS_SEG
                MOV     DL,LEFT_SIDE
                CALL    SAVE_CHAR
                MOV     COUNTER2,38
MIDDLE_LOOP:
                MOV     AL,CL
                CALL    SAVE_CHAR
                DEC     COUNTER2
                JNZ     MIDDLE_LOOP
                MOV     AL,CH
                CALL    SAVE_CHAR
                INC     DL
                RET
OPEN_LINE       ENDP

;--------------------------------------------------------------------
; SAVE_CHAR stores a character from the screen and displays a new char
;--------------------------------------------------------------------
SAVE_CHAR       PROC    NEAR
                ASSUME  CS:CSEG, DS:CSEG, ES:BIOS_SEG
                PUSH    AR              ;Save the new character
                CALL    READ_CHAR       ;Read the existing character
                CMP     GRAPH_TEXT,1
                JE      MODE_TEXT1
                MOV     AH,NORMAL       ;Use normal foreground color
MODE_TEXT1:
                MOV     ES:[DI],AR      ;And store it in the buffer
                INC     DI
                INC     DI
                POP     AR              ;Get back new character
                CMP     GRAPH_TEXT,1
                JE      MODE_TEXT2
                TEST    AL,10000000     ;Is this a high bit character
                JE      MODE_TEXT2      ;If not, just continue
                MOV     AL,"*"          ;If it is, reset it to "*"
MODE_TEXT2:
                CALL    DISPLAY_NORMAL  ;Put up the new character
                RET
SAVE_CHAR       ENDP
```

(SETMODE.ASM continues)

"Simple To Use, Works Well And Best Of All Is Easy On The Budget"

—PC Magazine



PC MAGAZINE EDITOR'S CHOICE

$395
JT Fax By Quadram

Send facsimiles with your PC/XT/AT or compatible and one of Quadram's JT Fax products.

Helpful menus and loads of versatile features make JT Fax easy to use—like auto-conversion of word processing files to ASCII. And you can add your letterhead and signature to documents automatically with any JT Fax product.

Fax To Go

If you're on the go, consider the JT Fax Portable. It slips into your pocket and plugs into any MS DOS portable's serial port to let you fax from wherever you are.

Common Interface

The JT Fax half card internal shares a common software interface with the JT Fax Portable and even the lightning fast JT Fax 9600, the lowest-priced 9600-baud adapter. With the LAN operating software, the JT Fax 9600 is perfect for shared use on a network.

So you can support dozens of word processing, spreadsheet, and graphics packages while sharing the same interface with others in your organization.

Unique Technical Approach

JT Fax was nominated for PC Magazine's Technical Excellence Award. And in selecting JT Fax Editor's Choice, PC Magazine said "An innovative approach is the key to the success of JT Fax: it converts documents on the fly while transmitting them at half the speed of the other units. This approach keeps its cost down and saves file storage space, without degrading image quality and without delaying typical transmission times appreciably."

TECHNICAL EXCELLENCE PC MAGAZINE

NOMINATED 1987

Call us at (404) 564-5666 for dealer information. Take a look at the JT Fax that meets your needs and see why JT Fax has been receiving such high praise. Quadram: One Quad Way, Norcross, Georgia 30093

Trademarks/owner: Quadram, Quadram logo, JT Fax/Quadram

QUADRAM®
An Intelligent Systems Company

CIRCLE 189 ON READER SERVICE CARD

WE DIDN'T INVENT REMOVABLE MASS STORAGE. WE SIMPLY PERFECTED IT.

NOT LONG AGO, removable mass storage was nothing more than documents and file cabinets. Businesses managed to keep track of information, but it wasn't easy. Then paper and steel gave way to computer-based systems like tape drives and floppy disks. An improvement, but primitive nonetheless. **ALONG CAME BERNOULLI,™** offering revolutionary internal and external mass storage solutions. Unlimited storage solutions with sturdy Bernoulli 5¼" and 8" Drives, and handy 10MB and 20MB removable Disk Cartridges. Just one 20MB Disk Cartridge has the storage capacity equivalent to 5,250 pages or 59 floppy disks.

Today, the armed forces and financial institutions use Bernoulli as a safe way to store data *and* a speedy backup system. Utilities and medical institutions take advantage of Bernoulli when transporting large amounts of data between locations.

Graphics, CAD/CAM and desktop-publishing users are increasing storage without constantly replacing or adding expensive hardware. And PC users of all kinds are downloading files on Bernoulli instead of bogging down their minis and mainframes.

IOMEGA REIGNS SUPREME as the leader in removable mass storage.* No other removable mass storage device offers Bernoulli Technology™— *the* technology that makes head crashes virtually impossible. And no one can equal Bernoulli's long-standing reputation for customer service and support.

Add the versatility of single or dual drive, internal or external systems for IBM® PCs and compatibles, PS/2™ Micro Channel,™ and Apple® Macintosh™— and you have the time-tested, reliable mass storage solution for every application.

IN THIS NEW ERA of removable storage, Bernoulli is the name you should know. Start today by calling 1-800-922-9400.**

IOMEGA®
Never ending storage.

BERNOULLI TECHNOLOGY

*According to the 1987 DISK/TREND Report Iomega retains 56.6% of the over-5 MB removable drive market. IBM is a registered trademark and PS/2 and Micro Channel are trademarks of IBM Corporation. Apple is a registered trademark of and Macintosh is a trademark licensed to Apple Computer Inc. **In Utah call 1-800-922-3131

CIRCLE 378 ON READER SERVICE CARD

■ UTILITIES

```
;-----------------------------------------------------------------
; TTY_STRING displays an ASCII string terminated with a byte of zero
;-----------------------------------------------------------------
TTY_STRING      PROC    NEAR
                ASSUME  CS:CSEG, DS:CSEG, ES:BIOS_SEG
                LODSB
                OR      AL,AL
                JZ      TTY_RET
                CALL    DISPLAY_NORMAL
                JMP     TTY_STRING
TTY_RET:
                RET
TTY_STRING      ENDP

;-----------------------------------------------------------------
; DISPLAY routines display a character using a BIOS function call
;-----------------------------------------------------------------
DISPLAY_NORMAL  PROC    NEAR
                ASSUME  CS:CSEG, DS:CSEG, ES:BIOS_SEG
                MOV     AX,NORMAL
DISPLAY_CHAR:
                PUSH    AX
                PUSH    CX
                CALL    GET_CURS_ADDR   ;Get address of BIOS cursor
                MOV     ES:[BX],DX      ;Tell BIOS where the cursor is
                MOV     BL,AH           ;Get back the attribute
                MOV     BH,ES:ACTIVE_PAGE ;Get active page
                MOV     CX,1            ;Write 1 character
                MOV     AH,9            ;Write character and attribute
                INT     10H
                POP     CX
                POP     BX
                INC     DL              ;Advance the cursor column
                RET                     ;Done writing the character
DISPLAY_NORMAL  ENDP

;-----------------------------------------------------------------
; READ_CHAR reads a character from the screen
;-----------------------------------------------------------------
READ_CHAR       PROC    NEAR
                ASSUME  CS:CSEG, DS:CSEG, ES:BIOS_SEG
                CALL    GET_CURS_ADDR   ;Get address of BIOS cursor
                MOV     ES:[BX],DX      ;Tell BIOS where the cursor is
                MOV     BH,ES:ACTIVE_PAGE ;Get active page
                MOV     AH,8            ;BIOS function to read character
                INT     10H             ;Read the character/attribute
                RET
READ_CHAR       ENDP

;-----------------------------------------------------------------
; GET_CURS_ADDR finds the address of the cursor for current video page
;-----------------------------------------------------------------
GET_CURS_ADDR   PROC    NEAR
                ASSUME  CS:CSEG, DS:CSEG, ES:BIOS_SEG
                MOV     BL,ES:ACTIVE_PAGE ;Get the current page number
                XOR     BH,BH           ;Convert to a word offset
                SHL     BX,1            ;Times two for a word
                ADD     BX,OFFSET CURSOR_POSN ;Add in base address
                RET
GET_CURS_ADDR   ENDP

;-----------------------------------------------------------------
YES_TXT         DB      "Yes",0
NO_TXT          DB      " No",0
NA_TXT          DB      "n/a",0
NONE_TXT        DB      " None",0
ODD_TXT         DB      "  Odd",0
EVEN_TXT        DB      " Even",0
SPACE_TXT       DB      "Space",0
MARK_TXT        DB      " Mark",0
PARITY_TABLE    DW      OFFSET ODD_TXT,   OFFSET EVEN_TXT
                DW      OFFSET SPACE_TXT, OFFSET MARK_TXT

;-----------------------------------------------------------------
; SHOW_PORTS displays the current settings of all comm ports
;-----------------------------------------------------------------
SHOW_PORTS      PROC    NEAR
                ASSUME  CS:CSEG, DS:CSEG, ES:BIOS_SEG
                XOR     BX,BX
                MOV     COUNTER1,BL     ;Start with first comm port
PORT_LOOP:
                MOV     AL,7            ;Seven columns per port column
                MUL     BL
                SHR     AL,1
                MOV     CX,4*256+16     ;Row/column for first item
                ADD     CL,LEFT_MIDX    ;Add in column of left edge
                ADD     CL,AL           ;And shift over to correct column

                MOV     DX,BX[BX]       ;Retrive the comm port address
                MOV     BP,DX           ;And save it here
                OR      DX,DX           ;Is there a card installed?
                JNZ     GOT_CARD        ;If yes, display its status
                MOV     SI,OFFSET NA_TXT
                MOV     DX,CX           ;Get row/column for this entry
                SUB     DL,2
                CALL    TTY_STRING      ;Display "n/a" text
                JMP     NEXT_PORT       ;And go on to next port
GOT_CARD:
                MOV     AL,"0"          ;Put a zero in bps column
                MOV     DX,CX
                CALL    DISPLAY_NORMAL  ;Display the zero
                MOV     DX,BP
                ADD     DX,3            ;Point to line control register
                CALL    READ_SET_BPS    ;Read the current baud rate
                PUSH    BX              ;Save it
                CALL    READ_SET_BPS    ;Restore original baud settings
                POP     BX              ;Now we have the bps in BX
                OR      BX,BX           ;Is it set to zero?
                JZ      NO_SPS_SET      ;If yes, just skip it
                XOR     DX,DX
                MOV     AX,11520
                DIV     BX

                MOV     COUNTER2,6      ;Display five digits
                PUSH    CX
                MOV     SI,CX           ;Save cursor position
                MOV     BX,10
                MOV     DX,AX
                XOR     AH,AH
CHAR_LOOP:
                MOV     CX,DX
                XOR     DX,DX
                DIV     BX
                XCHG    AX,CX
                DIV     BX
                XCHG    AH,DX
                ADD     AL,"0"          ;Convert this digit to ASCII
                PUSH    DX
                DEC     SI              ;Backup cursor position
                MOV     DX,SI
                CALL    DISPLAY_NORMAL  ;Display this digit
                DEC     COUNTER2
                POP     DX
                MOV     AX,CX
                OR      CX,DX
                JNZ     CHAR_LOOP
                MOV     DX,SI
FILL_BLANKS:
                DEC     DL
                MOV     AL," "
                CALL    DISPLAY_NORMAL
                DEC     DL
                DEC     COUNTER2
                JNZ     FILL_BLANKS
                POP     CX
NO_BPS_SET:
                MOV     DX,BP           ;Get back the port address
                ADD     DX,3            ;Line control register
                IN      AL,DX
                PUSH    AX              ;Save starting status
                MOV     SI,OFFSET NONE_TXT
                TEST    AL,00001000B    ;Look at parity enable bit
                JZ      NO_PARITY
                AND     AX,00110000B    ;Look at parity bits
                SHR     AX,1
                SHR     AX,1
                SHR     AX,1
                MOV     SI,AX
                MOV     SI,PARITY_TABLE[SI]
NO_PARITY:
                MOV     DX,CX
                SUB     DL,4
                ADD     DH,1
                CALL    TTY_STRING      ;Display parity status

                POP     AX
                PUSH    AX              ;Get line control status again
                AND     AL,00000011B    ;Look at data bits
                ADD     AL,"5"          ;Convert it to ASCII code
                MOV     DX,CX
                ADD     DH,2
                CALL    DISPLAY_NORMAL

                POP     DX
                PUSH    DX              ;Get line control status again
                MOV     AL,"1"          ;Assume one stop bit
                TEST    DL,00000100B    ;Are two stop bits needy
                JZ      ONE_STOP
                INC     AL
ONE_STOP:
                MOV     DX,CX
                ADD     DH,3
                CALL    DISPLAY_NORMAL

                MOV     DX,BP
                ADD     DX,6            ;Point to modem status register
                IN      AL,DX
                MOV     BX,OFFSET NO_TXT
                TEST    AL,00100000B    ;Is bit five set?
                JZ      NO_DSR          ;If not, DSR is not so
                MOV     BX,OFFSET YES_TXT
SO_DSR:
                MOV     DH,CX
                ADD     DH,4
                SUB     DL,2
                CALL    TTY_STRING

                POP     AX
                MOV     DX,BP           ;Get back the card adress
                ADD     DX,3
                OUT     DX,AL           ;Restore the line status register
NEXT_PORT:
                MOV     AL,COUNTER1
                XOR     BX,BX
                INC     BX
                INC     AX
                CMP     BL,8            ;No four comm ports
                JAE     PORT_DONE
                MOV     COUNTER1,BL
                JMP     PORT_LOOP
PORT_DONE:
                RET
SHOW_PORTS      ENDP

;-----------------------------------------------------------------
; READ_SET_BPS reads the current baud rate and sets a new one
;-----------------------------------------------------------------
READ_SET_BPS    PROC    NEAR
                ASSUME  CS:CSEG, DS:NOTHING, ES:NOTHING
                IN      AL,DX           ;Read the line status register
                MOV     AH,AL           ;Save initial line status
                MOV     AL,80H
                OUT     DX,AL
                SUB     DX,3            ;Get to low byte of divisor
                IN      AL,DX
                XCHG    BL,AL
                OUT     DX,AL           ;Write the high byte of divisor
                INC     DX              ;Get to high byte of divisor
                IN      AL,DX
                XCHG    AH,AL
                OUT     DX,AL           ;Write the high byte of divisor
                INC     DX              ;Back to line status register
                INC     DX
                MOV     AL,AH           ;Get back original line status
                OUT     DX,AL           ;And restore it
                RET
```

(SETMODE.ASM continues)

"Unlimited."

un·lim'i·ted, a. [L. limitus]: ***The ability to expand your personal computer's storage capacity beyond your wildest imagination.***

Up until now, the concept of unlimited PC storage capacity was about as practical as cramming all your office files into your briefcase. Storage capacity could only be stretched as far as the fixed capacity of your hard disk. Or to the limit of your patience for shuffling through stacks of floppies.

But imagine instead that you could insert and remove hard disks as easily as a VCR cassette—your PC's storage capacity would then be virtually limitless.

That's exactly the idea behind the Tandon Personal Data Pac, the world's first and only portable, Winchester hard disk. Just attach a low-cost Ad-PAC drive receptacle to your PC, and its powers of memory are totally transformed. You can choose from a number of self-contained, portable Personal Data Pacs that can be inserted and removed as easy as a floppy. Now a whole business worth of software and data can fit neatly into your briefcase. Ready to go anywhere your business will take you.

And when you are done for the day, your entire information base can be simply locked away where only you can get at it.

If you want to share your software and data with others, the Tandon Personal Data Pac offers you the cheapest and most reliable "network" possible. Simply transfer what you need from one Pac to another, and turn a shared PC into a dedicated workstation, just for you.

If your travels with the Data Pac take you on a bumpy road, don't worry. Your software and files will be safe and secure inside the Pac's rugged housing. It can even take a trip in the mail or an occasional fall off your desk.

See your Tandon Dealer today or call us at **1-800-556-1234,** ext. 171 (in California **1-800-441-2345,** ext. 171) and learn the new definition for personal computing.

The possibilities are limitless.

Tandon

We're redefining personal computing.

CIRCLE 232 ON READER SERVICE CARD

Business Performance
900
800
700
600
500
400
300
200
100
0
Jan/Mar
Apr/Jun
Jul/Sep
Oct/Dec

M I T S U B I S H I

What's black & white & read all over?

The new Mitsubishi® mp286L laptop personal computer.

Until now, thinking portable meant thinking compromise. In readability. Or speed. Or power. Or expandability. Or all of the above.

But now the mp286L eliminates the compromises.

Its big, bright, black and white "page white" backlit 11" display is easy on the eyes. It's readable from several feet away. In virtually any light.

A powerful 80286 processor clocks in at 12MHz, and that's probably faster than the desktop computer you're now using.

The 20MB internal hard disk and options including a math co-processor, internal modem, extended memory, and numeric keypad, put to rest once and for all the popular notion that you can't take it with you. With the mp286L, you can even move up to MS OS/2.™

But best of all, you don't have to compromise quality: the mp286L is built like a Mitsubishi: built to work long and work hard.

The mp286L is assembled in the U.S. for assured delivery and availability. Mitsubishi resellers are experienced specialists who provide systems support, training, and applications assistance you can count on.

Call toll-free: 1-800-556-1234 extension 25 (in California, 1-800-441-2345 extension 25) or write: Mitsubishi Electronics America, Inc., Computer Systems Division, 991 Knox Street, Torrance, CA 90502 for the authorized mp286L reseller nearest you.

Because the best choice in a laptop computer is right here in black and white.

MITSUBISHI ELECTRONICS

MS OS/2 is a trademark of Microsoft Corporation © 1988, Mitsubishi Electronics America, Inc

CIRCLE 371 ON READER SERVICE CARD

UNLOCK ITS FULL 386 POWER WITH SCO XENIX 386 – NOW!

Under DOS, the COMPAQ DESKPRO 386/20™ is a powerful single-tasking, single-user system that can run thousands of DOS applications. In 16-bit, 8086 mode.

One at a time.

When OS/2™ software becomes available, this computer can become a multitasking, single-user system running in 16-bit, 286 mode that can also single-task those DOS applications under OS/2.

One at a time.

With DOS or OS/2, it will support one user—for the cost of the entire system.

Under SCO™ XENIX® 386, however, the COMPAQ DESKPRO 386/20 becomes a powerful multitasking, multiuser system that can run thousands of proven XENIX applications. In full-tilt, 32-bit, 386 mode.

Many at a time.

Using SCO VP/ix,™ it can multitask all the same DOS applications under SCO XENIX.

Many at a time.

With SCO XENIX 386, this powerful computer can support multiuser configurations of 16, 32, or even more workstations with such blazing performance that individual users will believe they have the whole system to themselves—at an unbelievably low cost per user.

And the best news is that you can unlock the full power of the COMPAQ DESKPRO 386/20 today because you can get SCO XENIX 386—now!

SCO XENIX System V and the SCO XENIX family of software solutions is available for all industry-standard 8086-, 80286-, and 80386-based computers, and the IBM® Personal System/2™ Models 50, 60, and 80.

SCO
THE SANTA CRUZ OPERATION

(800) 626-UNIX (626-8649)
(408) 425-7222
FAX: (408) 458-4227
TWX: 910-598-4510 SCO SACZ
uucp:...decvax!microsoft!sco!info

IBM is a registered trademark and Personal System/2 and OS/2 are trademarks of International Business Machines Corporation. • COMPAQ DESKPRO 386/20 is a trademark of Compaq Computer Corporation. • SCO is a trademark of The Santa Cruz Operation, Inc. • XENIX is a registered trademark of Microsoft Corporation. • VP/ix is a trademark of INTERACTIVE Systems Corporation.
©1987 The Santa Cruz Operation, Inc. 400 Encinal Street, PO Box 1900 Santa Cruz, CA 95061
The Santa Cruz Operation, Ltd. 16 Nuel Street, PO Box 479, London W1A 4YN United Kingdom, +44 1 439 2911 (FAX) +44 1 637 9581 TELEX 917372 SCO UKG
11/87

CIRCLE 245 ON READER SERVICE CARD

■ UTILITIES

```
READ_SXT_BPS    ENDP

;-------------------------------------------------------------------
COLOR_TABLE     DB      1,2,1,2,2,1,1,3,2,2,3,2,1,2,2
RES_TABLE       DW      OFFSET RES_1, OFFSET RES_1, OFFSET RES_2
                DW      OFFSET RES_2, OFFSET RES_3, OFFSET RES_3
                DW      OFFSET RES_4, OFFSET RES_2, OFFSET RES_5
                DW      OFFSET RES_4, OFFSET RES_6, OFFSET RES_6
                DW      OFFSET RES_7, OFFSET RES_7, OFFSET RES_5
RES_1           DB      "25x40   ",0
RES_2           DB      "25x80   ",0
RES_3           DB      "320x200",0
RES_4           DB      "640x200",0
RES_5           DB      "320x200",0
RES_6           DB      "640x350",0
RES_7           DB      "640x480",0
TEXT_TXT        DB      "Text ",0
GRAPH_TXT       DB      "Graph",0
COLOR_TXT       DB      "Color",0
MONO_TXT        DB      "Mono ",0
SN_TXT          DB      "B/W  ",0

;-------------------------------------------------------------------
; SHOW_MODE displays the selected video mode number and resolution
;-------------------------------------------------------------------
SHOW_MODE       PROC    NEAR
                ASSUME  CS:CSEG, DS:CSEG, ES:BIOS_SEG
                MOV     BL,MODE_SELECT  ;Get selected mode
                MOV     DH,14           ;Put text on row 16
                MOV     DL,LEFT_SIDE
                ADD     DL,9

                MOV     AL,BL           ;Current mode into AL
                MOV     CL,10
                XOR     AH,AX
                DIV     CL              ;Divide by 10
                MOV     BH,AX           ;Save remainder for next digit
                OR      AL,AL           ;Is first digit a zero?
                JNE     TWO_DIGITS      ;If not, display it normally
                MOV     AL," "          ;Make first digit a space
TWO_DIGITS:
                ADD     AL,"0"          ;Convert digit to ASCII
                CALL    DISPLAY_NORMAL  ;First digit of mode number
                MOV     AL,BH
                ADD     AL,"0"
                CALL    DISPLAY_NORMAL  ;Second digit of mode number
                CMP     BL,19           ;Is this mode in table?
                JA      NOT_IN_TABLE
                ADD     DL,3            ;Skip three spaces
                XOR     BH,BH
                MOV     SI,OFFSET TEXT_TXT
                CMP     BL,7
                JE      TEXT_MODE
                JB      NOT_EGA_MODE
                SUB     BL,5
NOT_EGA_MODE:
                CMP     BL,3
                JBE     TEXT_MODE
                MOV     SI,OFFSET GRAPH_TXT
TEXT_MODE:
                CALL    TTY_STRING      ;Show text/graph mode
                INC     DL              ;Skip a space
                MOV     AL,COLOR_TABLE[BX]
                MOV     SI,OFFSET SN_TXT
                DEC     AL
                JZ      SHOW_COLOR
                MOV     SI,OFFSET COLOR_TXT
                DEC     AL
                JE      SHOW_COLOR
                MOV     SI,OFFSET MONO_TXT
SHOW_COLOR:
                CALL    TTY_STRING      ;Show color/bw mode selected
                INC     DL              ;Skip a space
                SHL     BX,1
                MOV     SI,RES_TABLE[BX]
                CALL    TTY_STRING      ;Display resolution of this mode
NOT_IN_TABLE:
                RET
SHOW_MODE       ENDP

;-------------------------------------------------------------------
; Interrupt 09 routine.  Watch for trigger key to pop up.
;-------------------------------------------------------------------
NEWINT09        PROC    FAR
                ASSUME  CS:CSEG, DS:NOTHING, ES:NOTHING
                STI                     ;Allow other interrupts
                PUSHF
                PUSH    AX              ;Must save processor state
                IN      AL,60H          ;Get the scan code
                CMP     AL,HOTKEY       ;Is it the hot key?
                JE      TRIGGER         ;If yes, check the mask
INT09_EXIT:     POP     AX              ;Restore the processor state
                POPF
                JMP     CS:OLDINT09     ;Continue with ROM routine
TRIGGER:        MOV     AX,2            ;Get keyboard status
                INT     16H             ;BIOS keyboard service
                AND     AL,0FH          ;Test only for shift keys
                CMP     AL,SHIFT_MASK   ;Does it match our combination?
                JNE     INT09_EXIT      ;If not, ignore it
                CMP     CS:BUSY_FLAG,0  ;Is SETMODE already active?
                JNZ     INT09_EXIT      ;If active, then exit
                INC     CS:BUSY_FLAG    ;Its active now

                IN      AL,61H          ;These instructions reset KB
                MOV     AH,AL
                OR      AL,80H
                OUT     61H,AL
                MOV     AL,AH
                JMP     SHORT KB_DELAY
KB_DELAY:
                OUT     61H,AL
                CLI
                MOV     AL,20H
                OUT     20H,AL          ;Reset the interrupt controller
                STI

                PUSH    AX              ;Must preserve all registers
                PUSH    BX
                PUSH    CX
                PUSH    DX
                PUSH    SI
                PUSH    DI
                PUSH    DS
                PUSH    ES
                PUSH    CS
                POP     DS              ;Set DS to CSEG
                MOV     AH,BIOS_SEG     ;ES points to BIOS data area
                MOV     ES,AX
                ASSUME  DS:CSEG, ES:BIOS_SEG
                CALL    SETMODE         ;Do the window
                DEC     BUSY_FLAG
                POP     ES              ;Restore all registers
                POP     DS
                ASSUME  DS:NOTHING, ES:NOTHING
                POP     DI
                POP     SI
                POP     BP
                POP     DX
                POP     CX
                POP     BX
                POP     AX
                POPF
                IRET                    ;Now were all done
NEWINT09        ENDP

;-------------------------------------------------------------------
; Here is the code used to initialize setmode
;-------------------------------------------------------------------
                ASSUME  CS:CSEG, DS:CSEG, ES:CSEG
EVEN                                    ;Align the buffer
WINDOW_BUFFER   LABEL   BYTE
INITIALIZE:
                MOV     DX,OFFSET COPYRIGHT     ;Do first half of copyright
                MOV     AH,9
                INT     21H

                MOV     AX,1A00H        ;Read display combination code
                INT     10H
                CMP     AL,1AH          ;Is VGA or MCGA present?
                JNE     NO_VGA
                MOV     AH,00010000B    ;Set bit for MCGA adapter
                CMP     BL,08H          ;Is it model 30 with mono?
                JE      SET_BITS
                CMP     BL,0CH          ;If it model 30 with color?
                JE      SET_BITS
                MOV     AH,00001000B    ;Set bit for VGA adapter
                CMP     BL,7            ;Is it VGA mono?
                JE      SET_BITS
                CMP     BL,8            ;Is it VGA color?
                JE      SET_BITS
NO_VGA:
                XOR     DH,DH
                MOV     AH,0BH          ;Look for a color adapter
                CALL    LOOK_FOR_CARD
                JNE     NO_COLOR
                OR      DH,00000010B    ;Set bit for color adapter
NO_COLOR:
                MOV     AH,0BH          ;Look for mono adapter
                CALL    LOOK_FOR_CARD
                JNE     NO_MONO
                OR      DH,00000001B    ;Set bit for mono adapter
NO_MONO:
                MOV     ADAPTER_FLAGS,DH
                MOV     AH,12H
                MOV     BL,10H          ;BIOS get EGA info function
                INT     15H
                CMP     BL,10H          ;Did BL change?
                JE      NOT_EGA         ;If not, no EGA present

                PUSH    ES
                MOV     AX,BIOS_SEG
                MOV     ES,AX
                ASSUME  ES:BIOS_SEG
                MOV     AH,00001000B    ;Set bit for EGA color
                TEST    ES:EGA_INFO,00000001B ;Is an EGA mono attached
                POP     ES
                ASSUME  ES:CSEG
                JZ      SET_BITS
                MOV     AH,00000010B    ;Set bit for EGA mono only
SET_BITS:
                OR      ADAPTER_FLAGS,AH
NOT_EGA:
; Search for a previously installed copy of setmode
                NOT     BYTE PTR START  ;Modify to avoid false match
                XOR     BX,BX           ;Start search at segment zero
                MOV     AX,CS           ;Compare to this code segment
NEXT_SEGMENT:
                INC     BX              ;Look at next segment
                CMP     AX,BX           ;Until reaching this code segment
                MOV     ES,BX
                JE      NOT_IRETALLED
                MOV     SI,OFFSET START ;Setup to compare strings
                MOV     DI,SI
                MOV     CX,16           ;16 bytes must match
                REPE    CMPSB           ;Compare DS:SI to ES:DI
                OR      CX,CX           ;Did the strings match?
                JNZ     NEXT_SEGMENT    ;If no match, try next segment
                MOV     DX,OFFSET INSTALLED_MSG
ERR_EXIT:       MOV     AH,9            ;DOS display string service
                INT     21H             ;Display error message
                MOV     AX,4C01H        ;Return error code
                INT     21H             ;Exit to DOS
NOT_INSTALLED:
                ASSUME  ES:NOTHING
                MOV     AH,3509H        ;Get keyboard vector
                INT     21H
                MOV     WORD PTR [OLDINT09],  BX  ;Save segment
                MOV     WORD PTR [OLDINT09+2],ES  ;Save offset
                MOV     DX,OFFSET NEWINT09
                MOV     AX, 2509H
                INT     21H             ;DOS function to change vector
```

(SETMODE.ASM continues)

LAN's Best Friend

Dependable UPS systems from American Power Conversion support the new UPS monitoring functions of:

- **Novell's SFT Level 2 NetWare™**
- **3 Com's 3S/400 server**
- **Banyan's VINES™**

Here's the American Power Conversion Advantage:

- Systems allow automatic, secure network shutdown during extended power outages.
- No supervisor intervention is required.
- Ideal for file servers which are sometimes unattended or attended by untrained personnel.
- Complete power protection from blackouts, sags, noise, and surges.

A broad range of UPS products covers all networking requirements:

330 XT	Low cost UPS protection for network workstations
450 AT	For AT type servers, 3 Com servers, and CAD workstations
520 ES	For SFT Level 2 and VINES file servers
800 RT	For large file servers with multiple hard drives
1200 VX	For multiple PC's or very long backup power duration.

International models available. Inquire about our UPS application handbook.

American Power Conversion

2 Columbia Street / P.O. Box 3723 / Peace Dale, RI 02883 / Tel. (401) 789-5735

CIRCLE 140 ON READER SERVICE CARD

■ UTILITIES

```
;-----------------------------------------------------------------
; Deallocate our copy of the Enviornment.  Terminate
; and stay resident. Leave code and space for buffer resident.
;-----------------------------------------------------------------

                MOV     AX,DS:[002CH]   ;Get segment of enviornment
                MOV     ES,AX           ;Put it into ES
                MOV     AH,49H          ;Release allocated memory
                INT     21H
                MOV     DX,OFFSET WISDOM_BUFFER + 40*10*2 + 15
                MOV     CL,4            ;Shift four to divide by 16
                SHR     DX,CL           ;Convert size to paragraphs
                MOV     AX,3100H        ;Return success status
                INT     21H

;-----------------------------------------------------------------
; This routine examines memory to look for a display card.
;-----------------------------------------------------------------
LOOK_FOR_CARD   PROC    NEAR
                ASSUME  CS:CSEG, DS:NOTHING, ES:NOTHING
                XOR     BX,BX           ;Look at offset zero
                PUSH    DS
                XOR     AL,AL
                MOV     DS,AX           ;Load the segment register
                MOV     CH,[BX]         ;Store the initial value
                MOV     AL,55H
                MOV     [BX],AL         ;Write pattern of ones and zeros
                JMP     SHORT DELAT     ;A short delay
DELAT:
                MOV     AH,[BX]         ;Read the byte we just wrote
                MOV     [BX],CH         ;Restore the initial value
                POP     DS
                CMP     AL,AH           ;Did it match?
                RET
LOOK_FOR_CARD   ENDP
CSEG            ENDS
                END     START                    (SETMODE.ASM ends)
```

gram is popped up, you'll see the current settings for up to four serial ports in the middle window (most PCs have only one or two installed). If you have an internal modem, it too will count as a serial port. Missing (or incorrectly installed) ports are indicated by "n/a" in the bps column.

To change a setting, use the Up and Down Arrow keys to position the moving bar on the desired item. If more than one port is installed, the Left and Right Arrow keys are used. Press either the Plus or Minus key to change the item's value.

Four parameters can be set for each port: bits per second (bps), parity, number of data bits, and number of stop bits. Although the RS-232 standard defines the technical details of the electrical interface, it allows many variations of the basic data format. Which settings will work is generally determined by the device which is connected. For example, most modems work at 1,200 or 2,400 bps, serial printers generally run at 9,600 bps. Both the PC

```
100 REM - BASIC PROGRAM TO CREATE SETMODE.COM
110 CLS:PRINT "Creating SETMODE.COM": OPEN "SETMODE.COM" AS 61 LEN = 1
120 FIELD 61, 1 AS A$: CHECKSUM6=0
130 FOR I = 1 TO   131
140   LINESUM4=0: LOCATE 2,3: PRINT "Countdown: "; 131 - I ;
150   FOR J = 1 TO  16: READ BYTE$: CHECKSUM4=CHECKSUM4+VAL("&H"+BYTE$)
160     LSET SUM$=LINESUM4+VAL("&H"+BYTE$)
170     IF (BYTE < 256) THEN LSET A$=CHR$(VAL("&H"+BYTE$)): PUT 61
180   NEXT J
190   READ LINETOT$: LSET CHECK$ = VAL("&H"+LINETOT$)
200   IF LINECHECK4 = LINESUM4 THEN GOTO 220
210   LOCATE 4,2: PRINT "Error in line 4"; 260 + 10 * I: GOTO 260
220 NEXT I
230 CLOSE: READ FILETOT$ : FILECHECK4 = VAL(FILETOT$)
240 IF CHECKSUM4 <> FILECHECK4 THEN GOTO 260
250 PRINT: PRINT "SETMODE.COM  created successfully": STOP
260 PRINT: PRINT "SETMODE.COM  is not valid!": END
270 DATA E9,  50,   7, 53, 45, 54, 4D, 4F, 44, 45, 20, 31, 2E, 3B, 20, 20,   453
280 DATA 63, 29, 20, 31, 39, 38, 38, 20, 5A, 69, 66, 66, 28, 43, 6F, 6D,   474
290 DATA 6D, 75, 6E, 69, 63, 61, 74, 69, 6F, 6E, 73, 20, 43, 6F, 2E, 0D,   5E7
300 DATA  A, 50, 43, 20, 4D, 61, 67, 61, 7A, 69, 6E, 65, 20, FB, 20, 54,   57B
310 DATA 6F, 6D, 20, 4B, 69, 6B, 6C, 6E, 65, 6E, D,  A, 49, 6F, 74, 6D,   56F
320 DATA 61, 79, 20, 69, 73, 20, 41, 6C, 74, 2D, 4D, 24, 1A, D,  A, 41,   42B
330 DATA 6C, 72, 65, 61, 64, 79, 20, 69, 73, 74, 61, 6C, 6C, 65, 64, 2E,   641
340 DATA 24,  2,  1, 53, 45, 54, 4D, 4F, 44, 45, 20, 31, 2E, 3B, 20, 20,   327
350 DATA 28, 10, 20, 19, 20, 1A, 20, 1E, 20, 20, 20, 2D, 20, 20, 3C, 43,   23D
360 DATA 52, 3E, 20, 45, 73, 63,  0,  4,  4, 43, 4F, 4D, 4D, 55, 4E, 49,   3EE
370 DATA 43, 41,-54, 49, 4F, 4E, 20, 58, 4F, 52, 54, 53,  0,  2,  9, 58,   3C9
380 DATA 6F, 72, 74, 3A,  0, 10,  5, 31,  0, 17,  5, 32,  0, 1B,  5, 33,   279
390 DATA  0, 25,  5, 34,  0,  2,  0, 42, 70, 73, 3A,  0,  2,  7, 58, 61,   27F
400 DATA 72, 49, 74, 79, 3A,  0,  2,  0, 44, 61, 74, 61, 20, 62, 69, 74,   4B5
410 DATA 73, 3A,  0,  2,  9, 53, 74, 6F, 70, 20, 42, 69, 74, 73, 3A,  0,   44A
420 DATA  2,  A, 44, 53, 52, 3A,  0,  4,  D, 44, 44, 53, 58, 4C, 41, 59,   354
430 DATA  0,  4,  0, 4D, 6F, 64, 65, 3A,  0,  2,  F, 30, 20, 31, 20, 32,   2B5
440 DATA 20, 33, 20, 34, 20, 35, 20, 36, 20, 37, 20, 31, 33, 20, 13, 34,   282
450 DATA 20, 31, 35, 20, 31, 36, 20, 31, 37, 20, 31, 38, 20, 31, 39,  0,   2A8
460 DATA  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,     0
470 DATA  0,  0, 36, 36, 36, 36, 36, 36, 36, 19,  0,  0,  0,  0,  0, 34,   1A7
480 DATA 14, 18, 34, 30, 18, 30, 1E, 18, 20, 28, 28, 20, 20, 30,  0,  0,   1A8
490 DATA  0,  0,  0, 1E, 18, 30, 18, 28, 20, 28, 80, 3E,  3, 26, FF, 37,   345
500 DATA 26, A8, 49,  0, 24, 7F, A2, 3B,  2, C6,  4, 3C,  2,  3, BB,  7,   45E
510 DATA 78, 3C,  7, 74, 23, E0,  3,  5, C6,  4, 3C,  2,  8, 3C,  3, 73,   3CE
520 DATA 15, C6,  4, 3C,  2,  1, 26, 8A, 3E, 62,  0, B4,  0, CD, 1B, 8A,   493
530 DATA DC, 8A, FC, 8B, F7, 77, 09, 1E, 36,  2, BF, 5E,  0, 26, 8A, 16,   718
540 DATA 4A,  8, 80, BA, 20, D8, BA, 80, 16, 3A,  2, 32, F6, C6,  4, 31,   695
550 DATA  2,  1, E8, 3D,  2, C6,  6, 31,  2,  6, E8, 25,  2, C6,  6, 33,   44B
560 DATA  2,  3, E8, 2D,  2, B9, 71,  1, AD,  A, CB, 76,  8, 8B, D0,  2,   59F
570 DATA 16, 3A,  2, E8, 8B,  2, EB, F8, 26, 8B, 3E, 45,  8, 13, 77,  C,   565
580 DATA E6,  8,  2, FE, C2, B6, 10, E8, 1E, B9, 8B,  2, 8B, EC,  2, B8,   866
590 DATA 8E,  4, 8A, 2E, 35,  2, E8, 96,  1, 32, E4, CD, 16, 50, 8A, 2E,   681
600 DATA 34,  2, 8B, 8A,  1, 58, 8B, FC, 40, 75, 35, 26, 83, 3E,  0,  0,   536
610 DATA  0, 74, D9, FE,  E, 3D,  2, 79, D3, C6,  4, 3D,  2,  4, EB, CC,   6AA
620 DATA 8B, FC, 58, 75, 32, FE,  6, 3D,  2, 8B, 3E, 3D,  2,  4, 76, DC,   5C9
630 DATA C6,  6, 3D,  8,  6, E8, 09, 8B, FC, 4E, 75,  5, 8B,  1, E8, 77,   6FE
640 DATA  0, 8B, FC, 4B, 75,  5, 8B, FF, E0, 6D,  8, 3C, 2B, 75,  5, B1,   5D7
650 DATA  1, E5, AB,  8, 3C, 2D, 75,  5, E1, FF, E5, 5F,  8, 8B, FC,  1,   72A
660 DATA 74,  6, 3C,  D, 74,  9, EB, 84, 26, A8, 49,  8, A2, 3E,  2, 32,   4CF
670 DATA F6, 8B, 5E,  8, 89, 2E,  8, 8A, 3E, 3D,  2, A3, 8B, F1,  1, B2,   748
680 DATA FA, FB, C6, 80, FB, 32, 75, EC, 8B, 1E,  2, 26, 8F,  7, 8A, 1E,   80D
690 DATA 3D,  2, 26, 3A, 3E, 45,  8, 74, 3E, 32, FF, 8A, 8F, 5E,  2, 26,   45E
700 DATA A1, 10,  0, 24, CF,  A, C1, 26, A3, 10,  0, 8B, C3, CD, 10, B4,   827
710 DATA  2, 33, D2, 32, FF, CD, 10, C3, 8B, 3E, 3D,  2,  0, 74, 1A, 8A,   520
720 DATA 3E, 3E,  2,  2, D0, 8A, 3E, 3E,  2, 8A, FB,  3, 77, 8A, 32, FF,   82E
730 DATA D1, E3, 26, 83, 3F,  0, 74, EA, C3, 80, 3E, 41,  2,  0, 74, 3B,   643
740 DATA 8A, 1E, 3E,  2,  2, D0, 8A, 1E, 3E,  2, 8A, FB, 32, 77, 8A, 32,   5C3
750 DATA FF, 8A, 8F, 42,  2, 22,  E, 41,  2, 74, DE, C3, 8A, 1E, 3E,  2,   5CC
760 DATA 32, FF, D1, E3, 26, 8B, 17, 83, C2,  3, 8A, 26, 3D,  2, FB, CC,   7AX
770 DATA 74,  F, FE, CC, 74, 3B, FB, CC, 76, 5B, FB, CC, 74, 65, E5, CB,   5DC
780 DATA FB, E8, C1,  2, E8, F9,  1, 75, 33, 83, FB,  3, 75,  1, 63, 01,   784
790 DATA EB,  B, 8A, 75, 16, 8A, 88,  1, EB, 13, 01, E3, N3, FB,  4, 75,   N3F
7A8 DATA  1, 40, 01, FB, NN,  1, 76,  3, 8B,  3,  0, E8, 57,  2, E9, 5B,   882
7B1 DATA FE, EC, 8A, D8, 24, C7, D0, EB, D0, EB, D0, EB,  2, D0, 80, E3,   BA6
7C0 DATA  7, FE, C3,  3, 75,  5, FE, C3,  6, 75, F1, D8, E3, D8, 03, DN,   556
7D8 DATA E3,  A, C3, EB, 33, EC, 8A, EN, 88, E4, FC,  2, C3, 24,  3,  A,   856
```

```
7E8 DATA C4, E8,  3, EC, 34,  4, EE, B9, 62, FB,  0,  6,  5,  3,  1, 8A,   6A4
7F8 DATA 36, 3D,  2,  A, F6, 74, 2E, 8A, DB, 32, FF, 8A, 8F, 9A,  4, 88,   6E1
808 DATA C6,  5, 88,  7, F6, 26, 3E,  2,  4, 31, 2A, C1,  2,  6, 3A,  2,   422
818 DATA 8A, D8, E8, D6,  8, 8A, E5, E8, E6,  8, FE, C9, 75, F4, C3, 8B,   A90
828 DATA 3B, 3B,  2, 12, 77, F8, E8, 1A,  8, E6,  F, E1,  2, EB, E3,  1,   646
838 DATA  3,  5,  7,  9,  B,  D,  F,  8,  8,  8,  8,  8, 12, 15, 18, 1B,    99
848 DATA 1E, 21, 24, 8A, 1E, 3B,  2, 32, FF, 8A, 97, DF,  4,  2, 16, 3A,   4CF
858 DATA  2, C3,  A, F6, 74,  0, B8, 2B, E9, 2B, 2B, E8, 1F,  8, B8, C9,   68A
868 DATA B9, CD, 8A, E8, 17,  5, 88, 8A, B9, 2B, 8A, B8,  F,  8, FE,  E,   848
878 DATA 31,  2, 75, F2, B8, C8, B9, CD, BC, E8,  1,  8, C3, 8A, 16, 3A,   7DA
888 DATA  2, E8, 38,  8, C6,  5, 32,  2, 26, 8A, C3, B8,  E,  8, FB, B,   575
898 DATA 32,  2, 75, F5, 8A, C5, E8,  3,  8, FE, C6, C3, 5B, E8, 4B,  8,   7E2
8A8 DATA 88, 3E, 3C,  2,  1, 74,  4, 8A, 26, 34,  2, 88,  5, 47, 47, 5B,   3CF
8B8 DATA 88, 3E, 3C,  2,  4, 74,  6, A0, 88, 74,  2, 88, 2A, E8,  C,  8,   4E3
8C8 DATA C3, AC,  A, CN, 74,  5, E8,  3,  8, EB, F6, C3, 8A, 26, 34,  2,   727
8D8 DATA 53, 51, E8, 26,  8, 26, 89, 17, 8A, DC, 26, 3A, 3E, 62,  8, 89,   5E7
8E8 DATA  1,  8, E4,  9, CD, 18, 59, 58, FE, C2, C3, B9,  D,  8, 26, 69,   676
8F8 DATA 17, 26, 8A, 3B, 62,  0, 84,  0, CD, 18, C3, 26, 8A, 1E, 62,  0,   4F3
908 DATA 32, FF, D1, E3, 81, C3, 50,  8, C3, 59, 65, 73,  8,  8, 4E, 6F,   74A
918 DATA  0, 6E, 2F, 61,  8, 28, 4E, 6F, 6E, 65,  0,  8, 28, 2F, 64, 64,   485
928 DATA  2, 8B,  7, F6, E3, D9, 88, B9, 18,  6,  2,  E, 3A,  3,  2, C8,   62F
938 DATA 26, 88, 17, 8B, EA,  8, D2, 75,  E, EE, C1,  5, 88, D1, 88, EA,   7H7
948 DATA  2, B8, 5D, FF, E9, C9,  8, E8, 3B, 88, D1, E8, 5E, FF, 88, D5,   9D9
958 DATA 83, C2,  3, E6, CF,  8, 53, E9, CD,  8, 5E,  E, D8, 74, 46, 33,   733
968 DATA D2, E8,  8, 2D, F7, F3, C6,  6, 32,  2,  6, 51, 88, F1, 8B,  A,   739
978 DATA  8, 88, D8, 33, C8, 88, CA, 33, E2, F7, F3, 91, F7, F3, 92,  4,   9A3
988 DATA 3B, 52, 4E, 88, D6, E8, 24, FF, FE,  N, 32,  2, 5A, 8E, C1,  B,   72D
998 DATA CA, 75, E2, 88, D6, FB, CA, B8, 2B, 8B, 1B, FF, FB, CA, FE,  E,   AX5
9A8 DATA 32,  2, 75, F1, 59, 8B, D5, 83, C2,  3, EC, 58, 8B, C5,  5, A8,   887
9B8 DATA  8, 74,  F, 25, 3B,  8, D1, E8, D1, 88, D1, E8, 8E, FB, 86, 84,   8C5
9C8 DATA E3,  5, 8E, D1, 88, 8A,  4, 88, C6,  1, E8, D4, FE, 58, 58, 24,   87F
9D8 DATA  3,  4, 35, 88, D1, 88, C6,  2, B9, D1, FB, 5A, 52, B8, 31, F6,   81A
9E8 DATA C2, 84,  2, FE, C8, 88, D1, 88, C6,  3, E8, EE, FE, 8E, D5,  9A3
9F8 DATA 93, C2, 6, 8D, 8D,  9, A8, 28, 74,  3, 8E, E9, 83, 55, 8E, D1,   7CE
A08 DATA 96, C6,  6, 88, BA,  2, E8, 98, FE, 58, 8B, D5, 83, C2,  3, E8,   922
A18 DATA 9A, 1B, 31,  2, 32, FF, 43, 43, 8B, FB,  8, 73,  7, 8B, 1E, 31,   566
A28 DATA  2, E9, FD, FB, C3, EC, 8A, E8, 88, 8B, EE, 83, BA,  3, EC, 86,   AFF
A38 DATA D8, EE, 42, EC, 86, F8, EE, 42, 42, 8A, C4, EB, C3,  1,  2,  1,   8N7
A48 DATA  2,  2,  1,  1,  3,  2,  2,  3,  2,  1,  2,  2, 3A,  7, 3A,  7,    99
A58 DATA 42,  7, 42,  7, 4A,  7, 4A,  7, 52,  7, 42,  7, 5A,  7, 52,  7,   298
A68 DATA 62,  7, 62,  7, 6A,  7, 6A,  7, 5A,  3, 32, 35, 76, 34, 30, 28,   378
A78 DATA 20,  8, 32, 35, 78, 30, 30, 30, 20,  8, 33, 32, 38, 78, 32, 38,   316
A88 DATA 38,  8, 36, 34, 38, 78, 32, 38, 38,  8, 33, 32, 38, 78, 32, 38,   341
A98 DATA 38,  8, 36, 34, 38, 78, 33, 35, 38,  8, 36, 34, 38, 78, 34, 38,   358
AA8 DATA 30,  8, 54, 65, 78, 74, 20,  8, 47, 72, 61, 78, 68,  8, 43, 6F,   499
AB8 DATA 6C, 6F, 72,  0, 4D, 6F, 6E, 6F, 28,  8, 42, 2F, 57, 28, 28,  8,   48N
AC8 DATA 8A, 1E, 38,  2, 86,  E, 8A, 16, 3A,  2, 88, C2,  9, 8A, C3, 81,   5CE
AD8 DATA  A, 32, E4, F6, F1, 8A, FC,  A, C8, 75,  2, 88, FB,  4, 38, E8,   88A
AE8 DATA CA, FD, 8A, C7,  4, 30, B8, C3, FD, 80, FB, 13, 77, 42, 88, C2,   97D
AF8 DATA  3, 32, FF, BE, 72,  7, 88, FE,  7, 74,  D, 72,  3, 88, EB,  5,   653
B08 DATA 89, FE,  3, 74,  3, EE, 78,  7, EB, 96, FE, FE, C2, 8A, 87,  E,   88D
B18 DATA  7, B8, 8A,  T, FE, C8, 74,  A, EE, 7N,  7, FE, C8, 74,  3, BN,   7D8
B28 DATA  7, E8, 7C, FD, FB, C2, 01, E3, 8B, B7, 1C,  7, FE,  3, 73, FD,   A1E
B38 DATA C3, FB, 9C, 5N, E4, 6N, 3C, 32, 74,  7, 5N, 9D, 2N, FF, 2N, 36,   75D
B48 DATA  2, 84,  2, CD, 16, 24,  F, 3C,  E, 35, EF, 2E, NE, 3E, 33,  2,   4H7
B58 DATA  0, 75, E7, 2B, FB,  6, 33,  2, E4, 81, 8A, EN,  C, B8, E6, 61,   745
B68 DATA 8A, C4, EB,  8, 86, 81, FA, BN, 20, B8, 20, FB, 53, 51, 52, 55,   896
B78 DATA 56, 57, 3E,  6,  E, 1F, 88, 4N,  8, 8E, C0, E8, 3C, FA, FB,  E,   64E
B88 DATA 33,  2,  7, 1F, 5F, 5E, 5D, 5A, 55, 5B, 5N, 5D, CF, 50, BA,  3,   594
B98 DATA  1, B4,  9, CD, 21, B8,  0, 1A, CD, 10, 3C, 1A, 75, 30, 86, 28,   512
BA8 DATA 8N, FE,  0, 74, 49, 88, FB,  C, 74, 44, B4, 10, 88, FB,  7, 74,   73C
BB8 DATA 3D, 88, FB,  0, 74, 3B, 32, F6, E4, E8, N8, 8N,  N, 75,  3, 88,   769
BC8 DATA CE,  2, B4, EN, 88, 78,  0, 75,  3, 88, CE,  1, 88, 36, 41,  2,   662
BD8 DATA B4, 12, E3, 1N, CD, 10, 88, FB, 3N, 74, 17,  4, 88, 46,  0, 8N,   688
BE8 DATA C8, B4,  6, 26, F6,  6, N7,  N,  2,  7, 74,  2, B4,  8,  0, 26,   4NA
BF8 DATA 41,  2, FE, 16,  N,  1, 33, DB, 8C, C8, 43, 3E, C3, NE, C3, 74,   6BN
C08 DATA 1A, BA,  N,  1, NN, FE, E9, 1N,  8, F3, A6,  E, C9, 75, EB, BA,   7E2
C18 DATA 5D,  1, E4,  5, CD, 21, B8,  1, 4C, CD, 31, E8,  9, 35, CD, 21,   5E8
C28 DATA 05, 3E, 36,  2, 8C,  6, 3B,  2, BA,  3,  0, 80,  5, 25, CD, 23,   442
C38 DATA A1, 3C,  0, 8E, CN, B4, 45, CD, 23, BA,  D,  E, 81,  4, D3, BA,   74D
C48 DATA E8,  N,  N, 33, CD, 23, 33, FE, 1E, 32, C8, N8, 80, 8A, 2C, 88,   556
C58 DATA E8,  4, EB,  N, 8A, 26, 88, 3C, 3F, 3A, C4, C3,  N,  N,  0,  N,   4B5
C68 DATA 2N224N
```

SETMODE.BAS: *A BASIC program that will automatically create SETMODE.COM.*

and the remote device it is communicating with must use identical settings. For a more detailed discussion of RS-232 communications, see the sidebar "Speaking the RS-232 Language."

SETMODE also displays the current state of the Data Set Ready (DSR) line. This value is read from pin 6 of the standard 25-pin connector. A "Yes" indicates the attached device is connected and powered up (although not necessarily online). If you have an internal modem, the DSR should always be active. A "No" is a sign that no connection has been made or the remote device is not operating. You can use this feature to determine if your equipment is attached and working properly. Normally the DSR indication should be on when equipment is attached properly.

WORDS OF CAUTION Since SETMODE deals directly with the machine's hardware, it is a very powerful program. While nothing you can do with SETMODE can damage your hardware, if you use the program incorrectly you can send your hardware into a tailspin. To prevent this from happening, you'll have to follow a couple of simple rules.

First, although SETMODE has enough smarts to keep you from switching to a video mode that isn't supported by your equipment, it won't prevent you from switching modes at the wrong time. To avoid problems, change modes only when at the DOS prompt rather than while running another program. Most software can't tolerate a video mode change and will revolt, either by doing nothing or by displaying garbage on the screen. When in doubt, selecting mode 3 for color monitors and mode 7 for monochrome should put things back to normal. These are the standard text modes and can be used by most software.

A second possible problem could arise if you pop up while a file transfer (which uses the serial port) is in progress. When SETMODE reads the communication port settings, it could interfere with the port's operation. Worse yet, if you changed the protocol parameters during a file transfer, the carrier signal could be disrupted. Again, making changes only when at the DOS prompt is recommended.

YOUR PERSONAL HOTKEY You can change the default Alt-M hotkey combination in one of two ways. If you have the program source code and an assembler, you can easily modify the equates for SHIFT_MASK and HOTKEY. Also change the text at label "COPYRIGHT" to display the new hotkey. Then reassemble and link the program and use EXE2BIN to convert the resulting executable file into the .COM format, as usual.

If you're starting with the .COM version of SETMODE, you can use DEBUG to make the changes. Values for the shift mask and scan codes can be found in Figure 3 and Figure 4, respectively. Notice the values are all in hexadecimal notation. The following example illustrates how to change the hotkey to Ctrl-X:

```
DEBUG SETMODE.COM
E 14C "Hotkey is Ctrl-X"
E 807   2D      ;Desired Scan code
E 818   04      ;Desired Shift Mask
W
Q
```

Be sure to enter *exactly* 16 characters (excluding the quotation marks) in the line

SHIFT_MASK Value Table

SHIFT_MASK value	Shift key (● = Pressed) Alt	Ctrl	Left Shift	Right Shift
0				
1				●
2			●	
3			●	●
4		●		
5		●		●
6		●	●	
7		●	●	●
8	●			
9	●			●
A	●		●	
B	●		●	●
C	●	●		
D	●	●		●
E	●	●	●	
F	●	●	●	●

Figure 3: *The combination of shift keys needed to pop up the program corresponds to a unique SHIFT_MASK value. Use this value when altering the program's default activation keys as explained in the article.*

Keyboard Scan Codes for Alternative Hotkeys

Key	Scan code in hex	Key	Scan code in hex
Esc	01	Z	2C
!1	02	X	2D
@2	03	C	2E
#3	04	V	2F
$4	05	B	30
%5	06	N	31
^6	07	M	32
&7	08	<,	33
*8	09	>.	34
(9	0A	?/	35
)0	0B	Right Shift	36
_-	0C	PrtSc*	37
+=	0D	Alt	38
Backspace	0E	Spacebar	39
Tab	0F	CapsLock	3A
Q	10	F1	3B
W	11	F2	3C
E	12	F3	3D
R	13	F4	3E
T	14	F5	3F
Y	15	F6	40
U	16	F7	41
I	17	F8	42
O	18	F9	43
P	19	F10	44
{[	1A	NumLock	45
}]	1B	ScrollLock	46
Enter	1C	7 Home	47
Ctrl	1D	8 Up Arrow	48
A	1E	9 PgUp	49
S	1F	-	4A
D	20	4 Left Arrow	4B
F	21	5	4C
G	22	6 Right Arrow	4D
H	23	+	4E
J	24	1 End	4F
K	25	2 Down Arrow	50
L	26	3 PgDn	51
:;	27	0 Ins	52
"'	28	. Del	53
~`	29	SysReq	54
Left Shift	2A	F11	57
|	2B	F12	58

Figure 4: *If the key combination used to activate the program is not to your liking, it may be easily changed to another setting. You may choose a new hotkey from the table above and then substitute the scan code for the key in the program as directed in the article. This ability to change keys adds to the SETMODE program's flexibility.*

The Most Important Question You Should Answer Before Buying Any Single User Accounting Software Program.

As your business grows you need to add more integrated terminals to your system. Will your accounting software program have upgradeability to 3.1 DOS with complete record and file locking functions?

Multiuser processing is a completely different environment than the single user. The vast majority of single user accounting software programs are incapable of upgradeability to complete record and file locking functions. COUGAR MOUNTAIN'S ACT 1 was designed from inception to have upgradeability to 3.1 DOS, giving you unlimited growth potential. All data files are automatically upgradeable to the multiuser version.

ACT 1 SERIES

ONLY

$139.50

Plus $11.50 Shipping & Handling

ACT 1 Awarded

Here's more reasons why ACT 1 has become the industry standard and why thousands of users are selecting, and changing to, ACT 1.

GENERAL FEATURES
"LOOKUP" Windows throughout.
Menu driven with 2 help references
Multi company and report generator.
Sample data files included.
Complete audit trail.
All modules can post to multiple profit centers.
Fully integrated with single source entry.
Data sensitive user-defined fiscal calendar
User defined financial reports
User can design checks, invoices, statements & W-2s
User defined chart of accounts, account numbers & stock numbers up to 15 alphanumerics

GENERAL LEDGER
Allows for multi company ledgers.
Unlimited multi-level accounts for departmentalized reporting.
Allows recurring journal entries.
User can process transactions 2 periods into next year.
Allows budgeting.

ACCOUNTS RECEIVABLE
Open invoice and/or balance forward
Allows unapplied payments
Prints statements.
Handles recurring accounts receivable
Supports partial payments & finance charges
Allows unapplied credit memos
Up to 5 user-defined aging periods
Mailing labels & reports with 7 different sorts.

INVENTORY
Supports: LIFO, FIFO, weighted averages & standard cost.
Supports markup, margin or list.
Allows up to 4 places to right of decimal for unit cost & price

SALES INVOICING
Supports service or product oriented businesses
User defined tax tables including multiple sales taxes.
Prints packing slips.
Prints invoices
Alerts user to customer exceeding credit limit.
Sales history reports.
Automatic updating of inventory daily
Allows return credit memos.

ACCOUNTS PAYABLE
Can post to 200 general ledger expense accounts per invoice
Prints checks.
Automatically prepares payments
Supports partial and handwritten checks
Processes credit and debit memos.
Computes discounts and records discounts taken.

PAYROLL
Generates automatic payroll.
Provides up to 8 user-defined rates.
Allows post facto payroll
Allows distribution of payroll expenses to user-defined departments.
Benefits and deductions are calculated on fixed amounts
Hourly amounts, percentags of gross or variable.
Allows additions to gross which may be taxable, nontaxable or partially taxed.
Handles 401K & cafeteria.
All tax tables easily updated by the user.
Handles payroll draws, per diem pay, contract & piece work, hourly and salary
Handles tip accounting.
Prints checks and W-2s.

HARDWARE REQUIREMENTS
IBM PC+ or compatible **HARD DISK REQUIRED.**

TO ORDER CALL (800) 344-2540 8:00-5:00 MST Monday-Friday

UNCONDITIONAL 30 DAY MONEY BACK GUARANTEE
applicable on all products bought directly from COUGAR MOUNTAIN SOFTWARE. Products must be returned in resaleable condition. Restocking fee applicable.

ACT 1 series is UPGRADEABLE to ACT 2 series which is multiuser for LANS & Networks. Data files are automatically upgradeable.

Trademarks:
IBM - International Business Machines
MS - DOS Microsoft, Inc. PC - DOS IBM

Technical support is available via our Toll-Free Telephone Number.

Training seminars available.

To order by mail send $139.50 plus $11.50 S&H to:

COUGAR MOUNTAIN S·O·F·T·W·A·R·E

2609 Kootenai, Box 6886, Boise, Idaho 83707, 208-344-2540

CIRCLE 194 ON READER SERVICE CARD

© 1988 Hayes Microcomputer Products, Inc. P.O. Box 105203 Atlanta, GA 30348.

LOOKS LIKE A JOB FOR SMARTCOM III.™

The best qualified communications software.
Put it to work for you. Call (800) 635-1225 for your nearest Hayes dealer.

Hayes.

CIRCLE 136 ON READER SERVICE CARD

SETMODE BY MODEM

The programs published in *PC Magazine* are available by modem from PC MagNet, an on-line service through which readers can discuss the columns with the editors.

To join PC MagNet, set your communications software for either 300 or 1,200 bps, 7 data bits, even parity, 1 stop bit, and full duplex. You can use any of more than 300 local access phone numbers, including: Boston, (617) 542-1796; New York, (212) 422-8820; Chicago, (312) 693-0330; or San Francisco (415) 956-4191. To find the number nearest your dialing exchange or for 2,400-bps service, connect with PC MagNet and type GO PHONES. For Customer Service, call (800) 848-8990; in Ohio and outside the United States, call (614) 457-8650.

When you connect with PC MagNet, press Ctrl-C. At the USER ID prompt, enter 177000,5000. Enter PC*MAGNET at the PASSWORD prompt and enter Z10D8813 at the ENTER AGREEMENT NUMBER prompt.

PC MagNet costs $12.50 an hour for 1,200/2,400-bps service and $6 for 300 bps, via MasterCard, VISA, or American Express. There is no additional charge for downloading source code or compiled programs from PC MagNet. These programs can be copied, but are copyrighted and are made available only for noncommercial use. You may make copies for others as long as no charge is involved, but making copies for any commercial purpose is strictly prohibited.

SETMODE.COM is already compiled and ready to run. SETMODE.BAS will automatically create SETMODE.COM when run once in BASIC. SETMODE.ASM allows you to modify the program, but requires you to use a macro assembler (IBM or Microsoft, Version 2 or later) and the following commands:

```
MASM SETMODE;
LINK SETMODE;
EXE2BIN SETMODE SETMODE.COM
```

Photocopy this page. Trim and hole-punch the copy and add it to your DOS manual.

SETMODE Command

Tom Kihlken 1988 No. 13 (Utilities)

Purpose: Provides menu-driven setup and change of video modes and communications parameters.

Format: `[d:][path]SETMODE`

Remarks: SETMODE is a memory-resident utility that may be loaded either at the DOS prompt or by being included as a line in an AUTOEXEC.BAT file. It takes no parameters. Its default hotkey is Alt-M, and it will pop up in either text or graphics mode.

The SETMODE window displays the current settings (bps, parity, data bits, stop bits) for up to four installed serial ports. Settings can be changed by moving the bar menu highlight to the desired parameter with the cursor arrow keys and using the Plus or Minus key to increment or decrement the value. Pressing either Esc or Enter removes the SETMODE screen and implements any communications parameter changes. The status of the Data Set Ready (DSR) line is also shown in the window, though it cannot be changed through SETMODE.

The current video mode is also displayed in the SETMODE pop-up window and can be changed by moving the menu bar to the desired mode and pressing Enter. Note that modes not supported by the display adapter(s) in the user's system cannot be selected. When a video mode change is made, the screen is left blank; pressing Enter a second time will restore the normal prompt.

Note: Although SETMODE will pop up over most existing applications, video mode changes should normally be made only from the DOS prompt, as many programs will crash if the mode is changed while they are running. Similarly, changes in communications protocols should not be made while a file transfer is in progress. Text characters beneath the SETMODE window are preserved if the mode is left unchanged, but graphics images are not.

Instructions for changing the default Alt-M hotkey are contained in the article.

that begins with "Hotkey is." If necessary, you should pad the string with blanks. It would be a good idea to keep a copy of the original program before modifying it with DEBUG. If you make a mistake, just enter "Q" to quit DEBUG and start over.

INSIDE THE CODE Now that we've seen what SETMODE does, let's take a look at how it works. From a programming standpoint, the logic is fairly simple. There are two main sections: the initialization routine and the resident portion. The very first instruction of the program contains a jump to the initialization portion, which can be found at the end of the program. Since the initialization routine is only needed once, it is later overlaid by the window buffer.

As usual, the first step is to determine if the program is already installed. Loading multiple copies of the same resident program would cause havoc with the system. A search through the computer's memory will reveal any existing copies, and if one is found the program simply terminates with an exit code of 1. Otherwise the installation continues by testing for the various display adapters (I'll explain how this is done shortly).

Two more steps are required before the program is ready to become a resident part of your system. First, the keyboard interrupt vector must be intercepted, to permit detection of the hotkey combination. DOS provides function calls that make this easy. Function 35h returns the current vector, and we save this address so we can JMP to it later. The new segment and offset are then placed into the vector table with function 25h. Second, before terminating, we release the memory occupied by our copy of the environment. We'll have no need for it and DOS can make use of it later.

The special terminate-and-stay-resident function is then used to return control to the operating system. A return code of 0 is passed back to indicate the installation was successful. The amount of memory reserved is just enough for the resident code and the window buffer. The window buffer is sized to hold the underlying display of 18 rows of 40 columns. Two bytes are re-

SPEAKING THE RS-232 LANGUAGE

Getting the protocol values correct is one of the most troublesome chores when communicating with serial devices. The data being transmitted consists of a series of carefully timed electrical signals. These signals are generated by a universal asynchronous receiver/transmitter (UART), which, in the IBM PC, is an Intel 8250. This chip converts a single byte of data into the required electrical pulses and provides several control signals that may be read and set by the system microprocessor.

Although the RS-232 standard has specified most communications parameters, there are still many possible protocols available. Both transmitter and receiver must obey the same timing rules for a successful transfer of data. To fully understand the required settings, here is a short course in asynchronous data transmission.

In *asynchronous* communications, the transmitter can send a word whenever it wants: it does not have to be locked in step with the receiver. Each word transmitted consists of a start bit, data bits, and framing bits. The exact format can be controlled by the communications software and is commonly known as the protocol. The layout of the series of pulses is shown in Figure A below.

The start bit is used to indicate when a word of data is about to arrive. When no data is flowing, the line is held in a mark state. Since an asynchronous system allows words to arrive at any time, a start bit is required to synchronize the timing of both systems. The data bits follow immediately thereafter, each one spaced one bit time apart. The common data formats utilize 7 or 8 bits in each word, though the UART itself allows anywhere from 5 to 8. If you hear about file transfer programs that can't send "high" bit characters, it's almost certainly because they use a 7-bit data format.

Following the data, the parity and stop bits are added. Logically enough, the stop bit marks the end of a word and returns the line to the idle state. The parity bit is generated by the UART hardware and can be used to detect transmission errors. This bit can be used in any one of five distinct ways: even, odd, mark, space, and none. When even parity is used, the parity bit is adjusted so that each word contains an even number of 1-bits. Odd parity is just the opposite. With mark parity the bit is always set, and with space parity it is always zero. No parity indicates the bit is missing entirely. Although parity allows the UART hard-

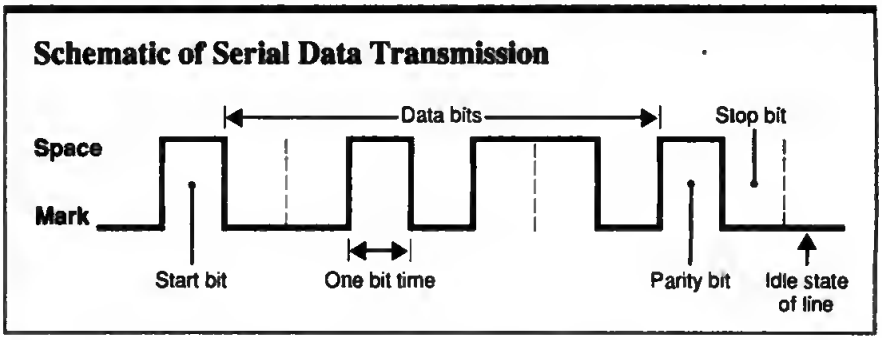


Figure A: *A series of signals such as these are generated by the UART to transmit each byte through the serial port.*

quired for each character—one for the character itself, the second for the attribute.

The resident code consists of two main procedures: the interrupt service routine for the keyboard, and the SETMODE routine itself. The purpose of the keyboard handler is straightforward. It examines every keystroke, comparing the scan codes with the selected hotkey. When a match is found, it checks the state of the shift, Ctrl, and Alt keys to determine if the correct one is also depressed. If not, control is passed to the original keyboard routine. When the correct hotkey combination is found, the keyboard is reset and all the registers are pushed on the stack (interrupt routines must always preserve the processor state). The main logic routine SETMODE is then called.

The first step in building the window is to save the cursor location (we'll be moving it about the screen to read and write characters). Then the underlying characters are read from the screen as the window is constructed. First, the border is drawn and the center filled with blanks. The text is added next. The two routines SHOW_PORTS and SHOW_MODE are then called to fill in the current settings of the system. The last step before soliciting a keystroke is to place the moving bar on the current item. Creating the moving bar is accomplished by reading the affected characters from the screen and writing them back with a new attribute.

The BIOS read keyboard routine is used to wait for the next keypress. When it arrives, we compare it with the seven possible command keys (Plus, Minus, Esc, and the four cursor arrows). If it doesn't match, we simply ignore it and wait for another key. Otherwise, the moving bar is erased (it will be replaced shortly) and the appropriate logic routine is called to process the command.

When an arrow key is pressed, several checks need to be made before moving the bar. Before a new video mode can be chosen, the bits in ADAPTER_FLAGS are ORed with a table to determine if the required adapter is present. If the result is zero, the mode is skipped and the bar moves to the next selection. The result is that only modes supported by the available hardware are allowed. A similar test is made when moving from one communications port to the next. The bar can be moved only if a valid port address is found in the BIOS data area.

When Enter is finally pressed, the original window is copied back to the screen. Next, the selected video mode is compared with the starting mode. If it's different, a mode change is required. To cause a mode change requires reprogramming a number of registers in the CRT controller chip. Gathering all the required data to do this for each adapter would have been a programmer's nightmare; luckily, the BIOS provides services that make it easy. The desired mode number is placed in register AL, AH is set to zero, and an interrupt 10h is executed. An extra step is required to accommodate multiple display adapters.

The BIOS maintains a word at address 0040:0010 that contains the equipment list. Bits 4 and 5 specify what type of display is attached. The initial value for these is read from the DIP switches on the motherboard when the machine boots. Normally, with only one display adapter, they need never change. But when two adapters are present, the equipment list must correctly indicate which display is active. SETMODE uses the OR instruction to place the correct value into this word each time it changes the mode.

THE PROGRAMMER'S NOTEBOOK

When programing in assembly language, there are always a number of interesting

ware to detect line errors, it is in fact seldom used. Instead, more-advanced error detection and correction is done through software. When software error detection is used, the parity bit is normally omitted to reduce transmission overhead.

The number of bits per second indicates the speed of the data link. To send a byte of data normally requires about 10 bits (including the start and stop bits), so the effective throughput for a 1,200-bps signal would be 120 bytes per second. Not long ago 1,200 bps was considered high speed. Today, 9,600-bps modems are available, and PC-to-PC communications using a direct connection can run even faster. On the PC and AT the maximum rate supported by the basic input output system is 9,600 bps. The new PS/2 machines have increased this to 19,200 bps. SETMODE allows you to set values up to a maximum of 115,200 bps, which is the absolute highest rate that can be programmed into the UART. Your modem probably won't be able to run that fast, but it is possible for it to conduct PC-to-PC communications at that speed. You'll need a high-performance communications software package and a null modem cable to connect the two serial ports.

To program the desired line settings, SETMODE must correctly set the internal registers of the UART. These registers are mapped into ports that are accessible to the central processor with IN and OUT instructions. Each communications adapter is assigned a unique series of port numbers, which are defined by the base address of the first register. The base address of each installed adapter can be found in the BIOS data area starting at address 0040:0000. Normally, the first serial port adapter is installed at address 3F8h and the second at 2F8h. If you've ever had to move a jumper on a serial port adapter board, these are the values that are affected.

When the UART starts sending, the data is transmitted on one of the 25 pins of the RS232 connector (the AT utilizes a 9-pin connector). A second pin is used for incoming data. Other pins can be used for various control signals but are not required for simple communications. The only one of interest here is the data set ready (DSR), which is an input to the PC. A modem raises this line to indicate it is ready to receive data. SETMODE reports the state of the data set ready line with either a Yes or a No.

—Tom Kihlken

■ UTILITIES

problems that must be solved, a couple of which are illustrated by certain details in SETMODE.

When a window is popped up over an existing program screen, the current screen display must be preserved so that it can be replaced when the window is removed. There are two common (and lightning-fast) methods of doing this. One method utilizes the display adapter's ability to store and display more than one page. The other method involves reading and writing the character/attribute data directly from display memory. However, SETMODE uses a different method, which, although much slower, has the advantage of working equally well in graphics and text modes.

The three SETMODE windows always occupy 18 rows of 40 columns each. The computer's Basic Input/Output System (BIOS) routines are used to read and write to the screen. These routines are designed to work in any of the available video modes. To read (or write) a character, the cursor is placed on the desired row/column and interrupt 10h is used to read (write) the data. Actually, I use a shortcut to save the time required to move the cursor. Instead of executing a BIOS function to move the cursor, the desired cursor location is written into the BIOS data area. (The read/write character functions always use the cursor location stored in memory, not its actual physical location.)

I mentioned above that the BIOS read character function works even in graphics modes, and this is not exactly true. It works only if normal character data is being displayed.

If a graphics display is present, the BIOS cannot read it. For this reason, graphics displays are not fully restored when a window is removed. The alternative is to store the entire graphics memory. I did not use this technique since it would require considerably more memory.

How SETMODE knows which display modes it can and cannot use is another programming detail of interest. The answer lies in the initialization routine. Six display options can be recognized: the monochrome display adapter (MDA), the color/graphics adapter (CGA), the enhanced graphics adapter with color monitor (EGA), an EGA with a monochrome display, the MCGA found on the new Model 30, and the new video graphics adapter (VGA). Each of these adapters can support only certain modes. Most other adapters emulate one of these and don't require any special consideration. The ADAPTER_FLAGS byte has a bit that is set for each adapter in the machine. When switching modes, if the required adapter bit is not set, the mode is not allowed.

Now for the problem of finding the system's adapter(s). To determine if the MDA and CGA adapters are present, the

Rapid lists. Rapid labels.

CALIFORNIANS Unite OF AMERICA

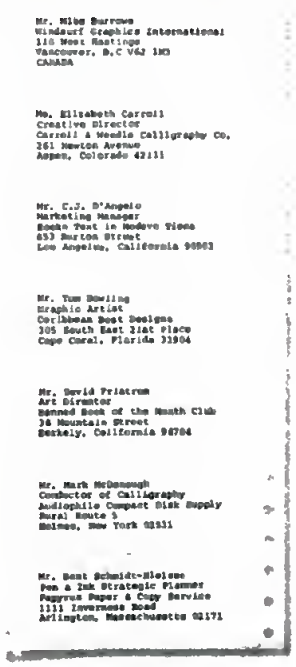
Time We'll Save With RapidFile per Month

Sorted and Totaled by Department

Department	Task	Hours Saved
Accounting	Accounts Receivable & Dunning Letters	61
	Cash receipts	16
	Invoicing	63
	**Total Hours Saved for Accounting	144
Administrative	Non-profit contributions	28
	Personnel files	136
	Pre-Printed forms - Deluxe Computer Forms	335
	Rotary Card file	33
	**Total Hours Saved for Administration	496
Operations	Cost estimation	248
	Job cost tracking	267
	Safety/accident history	24
	Vehicle fleet management	35
	**Total Hours Saved for Operations	575
Sales	Client file	87
	Convention registration	185
	Expense reports	121
	Form letters (mail merge)	348
	Mailing labels - Avery Laser Labels	630
	Mailing labels - gun fan	423
	Price quotation	162
	**Total Hours Saved for Sales	1,707
	**Total Hours Saved for Our Company	2,942

This Report Created Using RapidFile

Page 1



Mr. Mike Burrows
Windsurf Graphics International
110 West Hastings
Vancouver, B.C V6J 1M3
CANADA

Ms. Elizabeth Carroll
Creative Director
Carroll & Needle Calligraphy Co.
261 Newton Avenue
Aspen, Colorado 42111

Mr. C.J. D'Angelo
Marketing Manager
Books That is Modern Times
653 Burton Street
Los Angeles, California 90063

Mr. Tom Dowling
Graphic Artist
Caribbean Boat Designs
305 South East 21st Place
Cape Coral, Florida 33904

Mr. David Friatrom
Art Director
Banned Book of the Month Club
34 Mountain Street
Berkely, California 94704

Mr. Mark McDonough
Conductor of Calligraphy
Audiophile Compact Disk Supply
Rural Route 5
Nelson, New York 02131

Mr. Bent Schmidt-Nielsen
Pen & Ink Strategic Planner
Papyrus Paper & Copy Service
1111 Invermere Road
Arlington, Massachusetts 02171

In Colorado call (303) 799-4900, Ext. 0274. RapidFile runs on IBM PC or 100% compatible. Trademarks/owner: RapidFile, dBASE, MultiMate Advantage II, Framework, Ashton-Tate, Corp ; PFS: Professional File/Software Publishing Corp.; IBM/International Business Machines Corporation. RapidFile is written in MMSFORTH ©1984 Miller Microcomputer Services.

adapter's video buffer (at segments B000h and B800h) is examined. First, the byte at offset 0 is read and stored. Next the binary value 55h is written to the same location. After a short delay (to allow sufficient time for the display memory to react) the byte is read and compared with 55h. If it matches, a video adapter is assumed to be installed. The original value is then restored so that the display remains unaltered.

The method outlined in the IBM BIOS Interface *Technical Reference* manual is used to test for the presence of a MCGA, VGA, and EGA. First, to test for the VGA, we issue INT 10h with AX equal to 1A00h. This function reads the display combination code. If AL is not still equal to 1AH on return, there is no MCGA or VGA in the system. Otherwise, the value returned in register BL determines which display is in use. Similarly, to determine if an EGA is present, the EGA information function is used (INT 10h is issued with AH equal to 12h and BL equal to 10h). If, on return, BL is still equal to 10h, there is no EGA in the system.

Another interesting problem arose in connection with displaying the bps setting of the serial ports. This value is set by loading a divisor into the UART's registers. The UART converts the divisor into bps using the equation

```
bps = 115200 / divisor
```

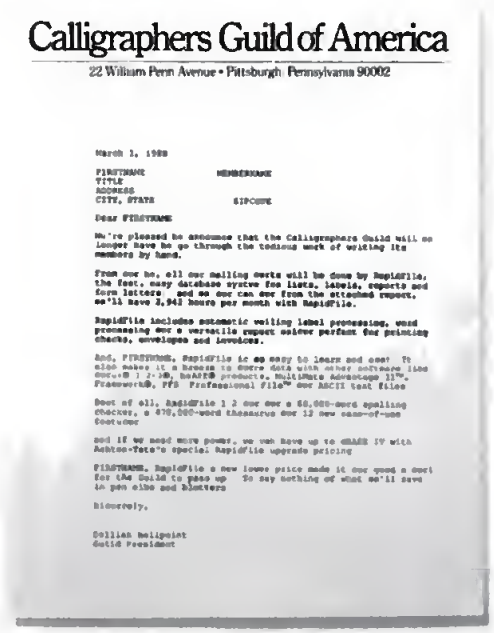
For a 16-bit processor, division with a number of this magnitude is no problem as long as the result is no greater than 65,535 (64K). But what if the bps rate is set greater than this? A divide overflow would result, producing a type 0 interrupt. This would then require special consideration, since it occurs from within a resident program. A little high school algebra eliminates the problem completely, however. Since we know all a normal bps rate is a multiple of 10, we divide the numerator by 10 and thus use 11,520 instead of 115,200 in the above equation. To produce the correct answer, the result is then simply multiplied by 10, i.e., a zero is appended to it.

One last consideration is needed in the above operation. Suppose the bps divisor was set to zero? (Inadvertently dividing by zero has long been a trouble area when evaluating mathematical equations.) The result of the division would be undefined and an interrupt 0 would be executed. To preclude this possibility a special test is made, and if SETMODE finds a divisor of zero, the division is simply not performed.

If your experience with the MODE command has been one of love and hate—with more of the latter—you now have an alternative. SETMODE can at least give you a fighting chance in the war between you and your peripherals.

Tom Kihlken is an occasional contributor to PC Magazine.

Rapid letters. Rapid File.



If you work with lists, mailing labels, form letters or reports, you should be working with RapidFile.™ It'll make quick work of all these tasks on your PC. Call (800) 367-8126, Ext. 0274* for more information or the name of the dealer nearest you.

ASHTON·TATE®

CIRCLE S19 ON READER SERVICE CARD

Ashton Tate logo/ Ashton Tate Corporation; Lotus, 1-2-3/Lotus Development
©1988 Ashton-Tate Corporation. All rights reserved

GENERIC ANNOUNCES NEW LEVELS OF CADD SOFTWARE

BECAUSE ONE SIZE NEVER FITS ALL!

It's gotten to the point where software is either too underpowered to get the job done or too complicated to use.

That's why we've developed new Generic CADD Levels software. Three different programs for IBM® PCs and compatibles that let you choose the level that fits your needs *exactly*.

What if your needs change? Just move up to the next level. Since every level works the same way, once you learn one it's easy to learn the next one.

GENERIC CADD LEVEL 1™

is just right if you're getting into CADD. It's an amazingly powerful package for only $49.95*. Yet it's simple to use and it can run on a two-floppy system.

GENERIC CADD LEVEL 2™

adds enhanced editing capabilities like automatic English or Metric dimensions, extension lines, arrows, and single line snaps and trims—all for $99.95*. Level 2 is perfect when you need a little more performance.

GENERIC CADD LEVEL 3™

is our fully featured package. Its advanced features include hatches and fills, poly line snap and trim, dynamic drag, macros, and EMS support for bigger drawings. This professional program has everything you need if you work with CADD every day. And you get all these features for just $199.95*.

*Suggested retail price

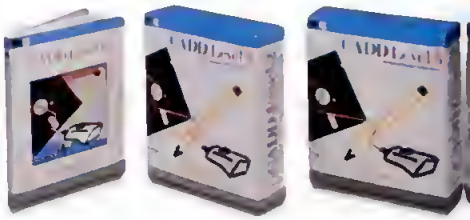
Send for our free CADDalog™.

To find out more about our new Levels software—as well as other Generic products—call or write for our free CADDalog.

Call 1-800-228-3601.

Or write Generic Software, 8763 148th Avenue NE, Redmond, WA 98052.

© 1988 Generic Software, Inc. Level 1, Level 2, Level 3, Generic CADD and CADDalog are trademarks of Generic Software, Inc.

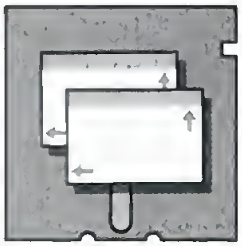


Generic
SOFTWARE

CIRCLE 506 ON READER SERVICE CARD

■ ENVIRONMENTS ■ CHARLES PETZOLD

INTRODUCING THE OS/2 PRESENTATION MANAGER



Here's a first look at OS/2 1.1, whose graphics-based interface sets standards for ease of learning and use for the next generation of application programs.

"The time has come," the Walrus said,
"To talk of many things:
Of messages and window procs,
Resources, menus, strings,
And how to use a dialog box
To make your programs sing."

In other words, my friends, the OS/2 Presentation Manager has arrived.

Paraphrasing Lewis Carroll on this occasion is certainly appropriate. The Presentation Manager is a wonderland of new ideas and concepts that, initially, can be disorienting and even a little scary. This is a system with its own architecture, its own vocabulary, its own Weltanschauung.

In this issue's column we'll take our first brave steps through the looking glass into the OS/2 Presentation Manager.

WHAT IT IS The Presentation Manager is part of OS/2 1.1, which is scheduled for retail availability from IBM in October 1988. Other computer manufacturers (such as Compaq and Zenith) are expected to license OS/2 1.1 from Microsoft and adapt it to their own hardware.

As with OS/2 1.0, Microsoft has made a preliminary beta-test version of the operating system available to programmers as part of its $3,000 OS/2 Software Development Kit (SDK). The beta version of the Presentation Manager was originally scheduled for shipment in December 1987 but was not shipped until April 1988. The Presentation Manager program that I'll show in this issue (and those in the next couple of Environments columns) is based on this April beta-test release. Keep in mind that there undoubtedly will be some changes in the Presentation Manager over the next few months that may affect these programs.

The Presentation Manager is a graphics-based multitasking windowing environment that looks and feels much like its DOS counterpart, *Microsoft Windows*, Version 2.0. This type of graphical interface (sometimes also called a "visual interface") incorporates menus, dialog boxes, scroll bars, buttons, and other objects that facilitate user input through the keyboard or a pointing device such as a mouse. The menu and dialog box interface is consistent across applications. Users often find that such an interface is easy to learn and use.

Figure 1 shows a typical Presentation Manager display. (It looks better in color.) The screen serves as a desktop. Each program occupies a rectangular area (called a window) on the desktop. The program is identified by a title bar across the top of the window. To the left of the title bar is a small box that invokes the drop-down sys-

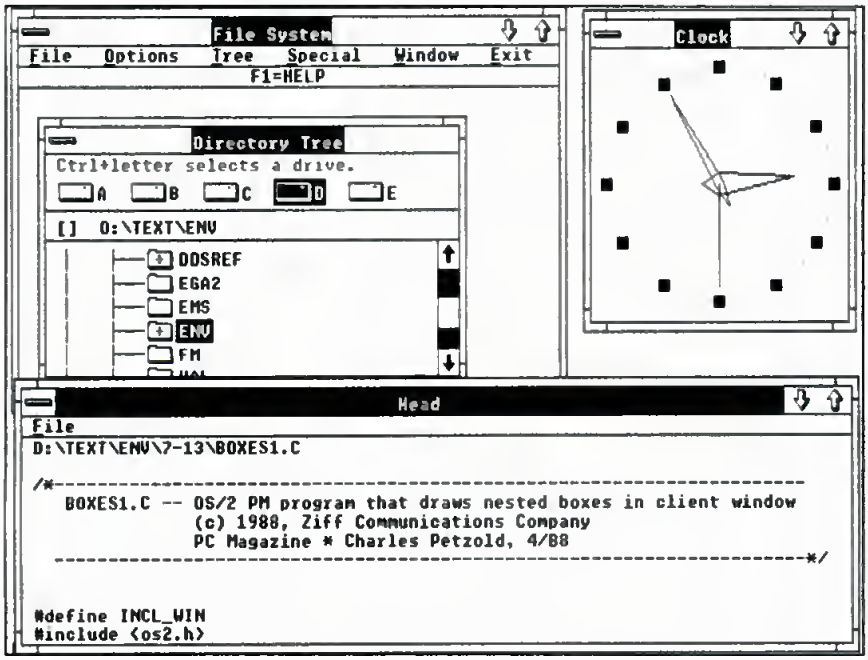


Figure 1: *A typical Presentation Manager display.*

■ ENVIRONMENTS

tem menu. The options on the system menu are generally the same for all applications. To the right of the title bar are two arrows. The arrow pointing up is used to "maximize" the window so that it fills the whole screen. The arrow pointing down is used to "minimize" the window so it occupies a small area at the bottom of the screen. The entire window is surrounded by a sizing border for changing the size of the window.

Below the title bar is the applications main menu (if the program uses a menu). Each option on the main menu invokes a drop-down menu. Some menu items invoke a dialog box, which is a smaller window containing "controls" such as buttons, check boxes, text entry fields, and list boxes.

The Presentation Manager (and programs running under it) occupy one OS/2 session. You can run OS/2 1.0 full-screen applications in other sessions and switch among the sessions. Most OS/2 1.0 applications will also run in a window under the Presentation Manager.

You can think of OS/2 1.1 as supporting two distinct and very different environments. The OS/2 kernel (which is part of both OS/2 1.0 and OS/2 1.1) is mostly for traditional character-mode applications that display output in a teletype fashion or use the full screen. The Presentation Manager is a more modern graphical windowing environment.

WHERE IT CAME FROM Of course, graphical windowing environments are not new. They were first developed in pioneering work done at the Xerox Palo Alto Research Center (PARC) beginning in the mid-1970s with machines known as the Alto and Star.

Windowing environments entered the personal computer arena in January 1983, when Apple Computer introduced the Lisa. The Lisa flopped, but a year later Apple introduced the Macintosh, which has proved to be very successful.

On the DOS and PC front, two graphical windowing environments were released in 1985: *Microsoft Windows* (originally announced by Microsoft in November 1983) and Digital Research's *GEM*. *Windows* was more successful than *GEM* in attracting PC software developers, but *GEM* met with some success on machines other than the PC, such as the Atari ST. Windowing environments have also shown up on other low-end personal computers, such as the Commodore Amiga and the Apple IIGS.

On the higher end of the small computer spectrum, workstations such as those developed by Sun Microsystems also run graphical windowing systems. Sun's major environments are called *SunWindows* and *SunView*. *SunView* runs under Unix on Sun's new 80386-based machine.

In the 1990s the typical computer display will present a graphical windowing environment. All the systems I've mentioned look a little different, yet from a user's perspective they are fundamentally quite similar. You can sit down with an application under any of these environments, use the mouse to explore the menus, and soon begin working.

This is quite surprising—somehow the computer industry has settled upon something like a standard in user interface design. Despite the recent bizarre look-and-feel lawsuit initiated by Apple (whose lawyers apparently believe the graphical interface was invented in Cupertino, California), windows are here to stay.

IBM in particular has big plans for the Presentation Manager. The Presentation Manager forms one of the cornerstones of Systems Application Architecture (SAA), which is an attempt to standardize user interfaces and application program interfaces (APIs) across IBM's entire line of computers. If this comes to pass (and some people feel it is crucial to IBM's long-term survival), the Presentation Manager interface will be a common sight to users of all IBM computers.

HOW DOES IT KNOW? The first time I saw a windowing environment, I was baffled by how it worked. One common demonstration showed how a window could be resized by the user. The strange thing was that some applications would adjust the contents of the window to the new window size. An analog clock would grow or shrink to the largest size the window could accommodate. A window displaying text would use a different right margin for word wrap.

I knew that the logic for resizing the windows was obviously built into the operating system rather than being duplicated by each application. That made a lot of sense to me. But after the window was resized, how did the program know that the window size had changed?

```
/*-------------------------------------------------------------------
   BOXES1.C -- OS/2 PM program that draws nested boxes in client window
               (c) 1988, Ziff Communications Company
               PC Magazine * Charles Petzold, 4/88
  -------------------------------------------------------------------*/

#define INCL_WIN
#include <os2.h>
#include <stddef.h>

#define NUMBOXES  50      /* number of boxes to draw     */
#define INCREMENT 20      /* rotate each 1/20th of side */

MRESULT EXPENTRY ClientWndProc (HWND, USHORT, MPARAM, MPARAM) ;

int main (void)
     {
     static CHAR szClientClass [] = "Boxes1" ;
     HAB         hab ;
     HMQ         hmq ;
     HWND        hwndFrame, hwndClient ;
     QMSG        qmsg ;

     hab = WinInitialize (0) ;
     hmq = WinCreateMsgQueue (hab, 0) ;

     WinRegisterClass (
                    hab,                /* Anchor block handle              */
                    szClientClass,      /* Name of class being registered   */
                    ClientWndProc,      /* Window procedure for class       */
                                                              (continues)
```

Figure 2: *The BOXES1.C program draws a series of nested rectangles in its window.*

```
                    CS_SIZEREDRAW,      /* Class style                    */
                    0) ;                /* Extra bytes to reserve         */

     hwndFrame = WinCreateStdWindow (
                    HWND_DESKTOP,       /* Parent window handle           */
                    WS_VISIBLE          /* Style of frame window          */
                         | FS_SIZEBORDER
                         | FS_TITLEBAR
                         | FS_SYSMENU
                         | FS_MINMAX,
                    szClientClass,      /* Client window class name       */
                    szClientClass,      /* Title bar text                 */
                    0L,                 /* Style of client window         */
                    NULL,               /* Module handle for resources    */
                    0,                  /* ID of resources                */
                    &hwndClient) ;      /* Pointer to client window handle */

     while (WinGetMsg (hab, &qmsg, NULL, 0, 0))
          WinDispatchMsg (hab, &qmsg) ;

     WinDestroyWindow (hwndFrame) ;
     WinDestroyMsgQueue (hmq) ;
     WinTerminate (hab) ;

     return 0 ;
     }

MRESULT EXPENTRY ClientWndProc (HWND hwnd, USHORT msg, MPARAM mp1, MPARAM mp2)
     {
     static SHORT xClient, yClient ;
     HPS          hps;
     POINTL       ptl[5] ;
SHORT        sRep, sSide ;

switch (msg)
     {
     case WM_SIZE:
          xClient = SHORT1FROMMP (mp2) ;
          yClient = SHORT2FROMMP (mp2) ;
          break ;

     case WM_ERASEBACKGROUND:
          return TRUE ;

     case WM_PAINT:
          hps = WinBeginPaint (hwnd, NULL, NULL) ;

          ptl[3].x = ptl[1].x = 0 ;
          ptl[2].x = ptl[3].x = xClient - 1 ;
          ptl[0].y = ptl[3].y = 0 ;
          ptl[1].y = ptl[2].y = yClient - 1 ;

          for (sRep = 0 ; sRep < NUMBOXES ; sRep ++)
               {
               ptl[4] = ptl[0] ;

               GpiMove (hps, ptl) ;
               GpiPolyLine (hps, 4L, ptl + 1) ;

               for (sSide = 0 ; sSide < 4 ; sSide++)
                    {
                    ptl[sSide].x = ((INCREMENT - 1) * ptl[sSide].x +
                                        ptl[sSide + 1].x +
                                             INCREMENT / 2) / INCREMENT ;

                    ptl[sSide].y = ((INCREMENT - 1) * ptl[sSide].y +
                                        ptl[sSide + 1].y +
                                             INCREMENT / 2) / INCREMENT ;
                    }
               }
          WinEndPaint (hps) ;
          break ;

     default:
          return WinDefWindowProc (hwnd, msg, mp1, mp2) ;
     }
return FALSE ;
}
```

(Figure 2 ends)

Think about it. Suppose you're running a DOS spreadsheet program in character mode on an EGA. Suddenly some deviant RAM-resident program calls interrupt 10h in the PC's BIOS to switch to a 43-line mode. Will the spreadsheet program suddenly use 43 lines? Of course not! The program has no way of knowing the video mode has been changed unless it checks the BIOS.

But these windowed programs apparently knew when the window was resized without being involved in the resizing itself. The programs were getting information from the operating system through some mechanism that didn't fit into the framework of any programming language or operating system architecture with which I was familiar.

IT GETS A MESSAGE! It turns out that the question "How does it know?" is an important one. The answer is central to the architecture of windowing environments in general and the Presentation Manager in particular. It's actually quite simple: the Presentation Manager sends a "message" to the application. In this particular example, the message says: "Hey, app, I've just allowed the user to change the size of your window. You might want to take that into account the next time you redraw the window contents."

A Presentation Manager program learns of many external events through messages. Keystrokes are translated into messages; so are mouse events. When a user makes a menu selection, the menu sends a message informing the program of the selection. When the user pushes a button on a dialog box, the button sends a message saying it was pushed. Basically, all that a Presentation Manager program does is receive messages and process them.

Of course, this sounds very strange initially. How can a menu "send a message"? What's really going on? What does that mean in terms of code?

Maybe it's time to look at some code. Figure 2 shows a small Presentation Manager program called BOXES1. Like most Presentation Manager programs, it is written in C. When compiled, BOXES1 displays the series of nested rectangles shown in Figure 3. BOXES1 adjusts their size and

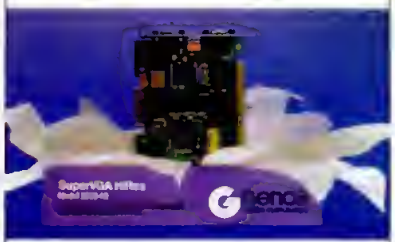
Take a peek at Genoa's new PC graphics add-ons.

You've known Genoa as a developer of high performance graphics chips, and a leading manufacturer of graphics boards and tape backup. Soon you'll be able to depend on us for all your PC graphics add-on hardware.

Over the next year, we'll be unwrapping a series of graphics products. Each is designed to give you the most reliable, yet innovative engineering features. And above all, the highest performance possible.

Our SuperVGA HiRes family, featured here, is the first in our new product series. SuperVGA HiRes offers breathtaking color and resolution. From 16 colors in 1024x768. Up to 256 colors in 800x600. You'll see more of your spreadsheets at once with SuperVGA HiRes. 132 columns and 60 rows. You'll do Windows or OS/2. In fact, every SuperVGA HiRes feature is designed to turn your IBM PC/XT/AT and PS/2 models 25 and 30 into real graphics engines.

Delivering SuperVGA HiRes™ now!



- 100% IBM VGA compatible
- Advanced features
  - —1024x768 in 16 colors and 800x600 in 256 colors/Model 5200
  - —512x512 in 256 colors/Model 5100
- 132 columns text
- For both analog and TTL displays

If you're looking for PC graphics add-ons, take a look at Genoa first. Our new line of products is starting delivery *now!*

For the Genoa dealer nearest you or to add your name to our mailing list contact: Genoa Systems Corporation, 73 E.Trimble Road, San Jose, CA 95131. Fax: 408/434-0997. Telex: 172319. Or phone: 408/432-9090. In the UK, contact Genoa Systems Limited, phone: 01-225-3247. In the Far East, contact Genoa/Taiwan, phone: 2-776-3933.

CIRCLE 239 ON READER SERVICE CARD

Genoa SYSTEMS CORPORATION

Delivering PC Graphics

408/432-9090

© 1988 Genoa Systems Corporation. SuperVGA HiRes is a trademark of Genoa Systems Corporation. Windows is a trademark of Microsoft, Inc. IBM PC/XT/AT, PS/2, and OS/2 are trademarks of International Business Machines.

shape to the window size. Figure 4 shows multiple copies of BOXES1 running under the Presentation Manager, each in a different size of window.

THE HEADER FILES At first glance, BOXES1.C does not even look like a C program. Presentation Manager programs tend to be API-intensive. They use lots of special data types, identifiers, and functions that aren't part of C at all.

Near the top of BOXES1.C is the preprocessor statement

```
#include <os2.h>
```

This statement brings in 12 more C header files besides OS2.H that total about 256K.

The header files include function declarations for all 220 function calls in OS/2 1.0 (functions with the Dos, Vio, Kbd, and Mou prefixes) and for another 520 function calls added by OS/2 1.1.

These 520 new functions calls are mostly for the two major components of OS/2. The first component is devoted to the windowing and user interface functions. (This is the component that was derived largely from *Microsoft Windows* 2.0.) The 250 functions in this component begin with the prefix Win.

The second major component of the Presentation Manager is a device-independent graphics system called the Graphics Programming Interface (GPI). GPI is derived largely from IBM's Graphical Data Display Manager (GDDM) and the 3270 Graphics Control Program (GCP). The 230 GPI functions have the prefix Gpi.

Presentation Manager functions names use mixed upper- and lowercase and are often quite descriptive. OS/2 trivia: The longest OS/2 function name is 30 characters long. There are three functions of this length:

```
GpiDeleteElementsBetweenLabels
GpiQuerySegmentTransformMatrix
GpiQueryViewingTransformMatrix
```

BOXES1.C uses a small fraction of these 740 function calls, specifically the 12 Win functions and 2 Gpi functions shown in Figure 5. I'll describe these 14 functions in more detail below.

The header files also define many new data types and structures. These use uppercase identifiers. Figure 6 shows the Presentation Manager data types used in BOXES1.C.

Some of these new data types are rather simple and self-explanatory. (For example, SHORT is a signed short integer.) But using these data types rather than normal C data types should allow programs to be more easily ported to the 80386 version of OS/2 and also to be ported to versions of the Presentation Manager that run on ma-

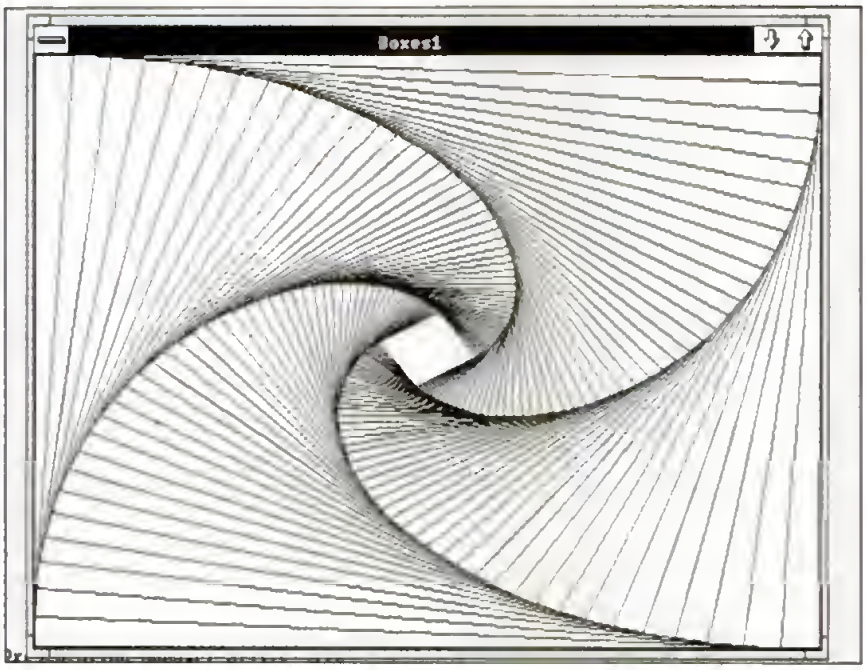


Figure 3: *BOXES1 running under the Presentation Manager.*

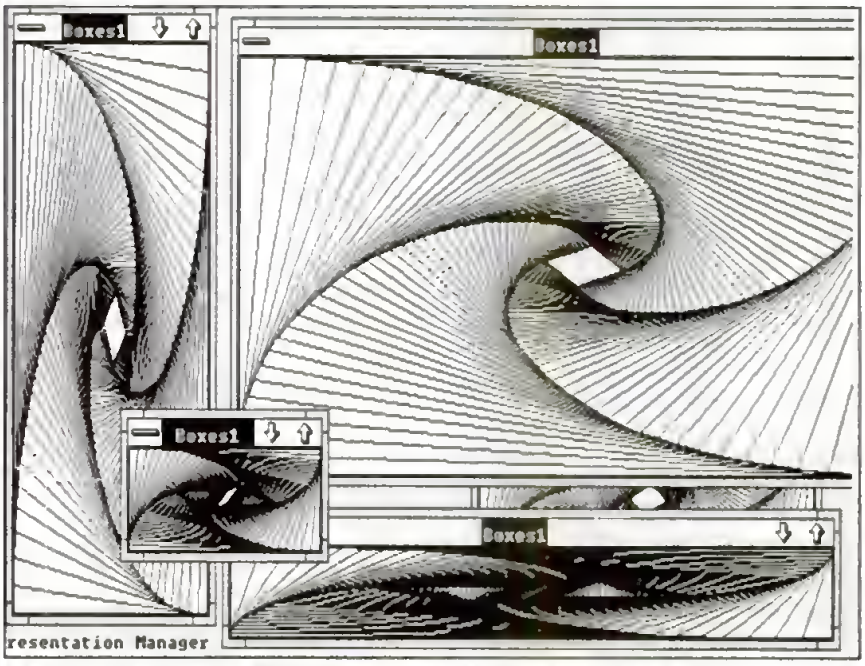


Figure 4: *Multiple copies of BOXES1 running under the Presentation Manager.*

chines other than personal computers.

The header files also define lots of identifiers that lessen the use of numeric constants in your programs. I've counted (not by hand!) about 2,400 #define statements in the 13 OS/2 header files. Those used in BOXES1 are shown in Figure 7.

Most OS/2 identifiers begin with a short prefix (such as FS) that indicates a large group of identifiers ("frame styles"). You aren't required to use these identifiers, of course. For example, you could use the number 35 rather than the identifier WM_PAINT. But which would you prefer to remember?

The header files also define some helpful macros. Two of these macros, SHORT1FROMMP and SHORT2FROMMP, are used in BOXES1.C.

The distinctive "look" of Presentation Manager C code also results from the prevalent use of a variable naming convention called "Hungarian notation" in honor of the legendary Microsoft programmer, Charles Simonyi. Basically, the first few lowercase letters of a variable name identify the type of the variable. SHORT variables are given a prefix of s (for example, sRep and sSide in BOXES1.C); HWND variables are given a prefix of hwnd (such as hwndFrame and hwndClient). Again, you aren't required to use Hungarian notation, but it's a big help in eliminating code errors before they become bugs.

PROGRAM ENTRY POINT As with a normal C program, the entry point to a Presentation Manager program is a function named `main`. The code shown in the `main` function of BOXES1.C is fairly normal. You'll see similar code in virtually every Presentation Manager program.

The WinInitialize function at the beginning of `main` registers the program with the Presentation Manager. You call WinInitialize before calling any other Presentation Manager function. The function returns a number known as an "anchor block handle." This handle uniquely identifies your program. Before the program terminates (at the end of `main` in BOXES1.C), the call to WinTerminate releases the anchor block handle.

The WinCreateMsgQueue function creates a "message queue." The Presentation Manager uses the message queue to store messages for all windows created by the thread that calls the function. The function returns a handle to the message queue. Before the program terminates, it calls WinDestroyMsgQueue to destroy the message queue.

MORE THAN ONE WINDOW The WinCreateStdWindow function creates a standard application window. Until now I've been using the word "window" rather loosely to refer to the area that an application occupies on the screen. Actually,

Presentation Manager Function Calls

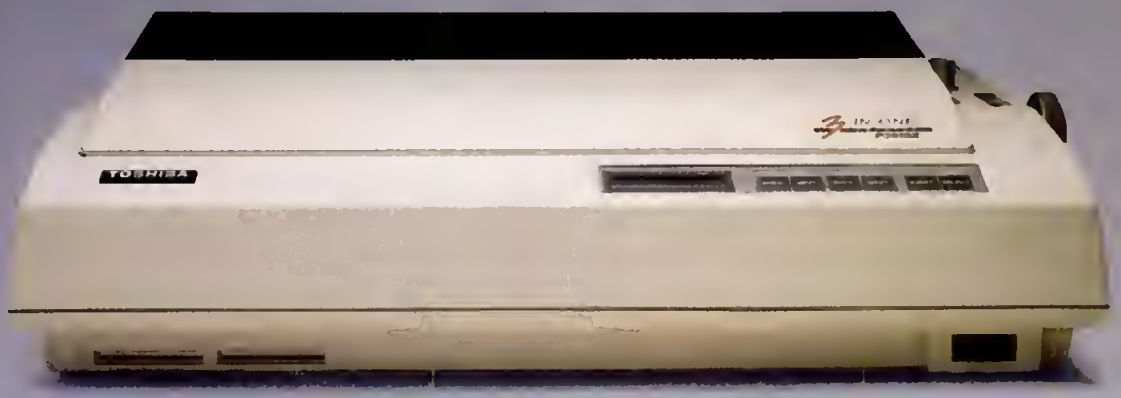
Function name	Description
GpiMove	Move current position for subsequent graphics drawing
GpiPolyLine	Draw series of lines starting at current position
WinBeginPaint	Get presentation space handle during WM_PAINT message
WinCreateMsgQueue	Create a message queue
WinCreateStdWindow	Create a standard frame window with child windows
WinDefWindowProc	Default message processing
WinDestroyMsgQueue	Destroy a message queue
WinDestroyWindow	Destroy a window and its children
WinDispatchMsg	Send a message to window procedure
WinEndPaint	Release presentation space handle during WM_PAINT message
WinGetMsg	Get the next message from the message queue
WinInitialize	Initialize Presentation Manager facilities for use by program
WinRegisterClass	Register a window class based on a window procedure
WinTerminate	Release Presentation Manager facilities before program ends

Figure 5: *The Presentation Manager functions used in BOXES1. The function calls used in BOXES1 illustrate the new declarations supporting the two major components of OS/2: the Graphic Programming Interface and the windowing and user interface.*

New Data Types and Structures

Presentation Manager data type	C data type	Description
CHAR	signed char	Signed 8-bit value
EXPENTRY	pascal far	Exported entry point
HAB	void far *	Handle to an anchor block
HMQ	void far *	Handle to a message queue
HPS	void far *	Handle to a presentation space
HWND	void far *	Handle to a window
MPARAM	void far *	Message parameter
MRESULT	void far *	Message result
POINTL		Graphics point structure
QMSG		Queue message structure
SHORT	signed short	Signed 16-bit value
USHORT	unsigned short	Unsigned 16-bit value

Figure 6: *The data types used in BOXES1 and other Presentation Manager programs make these programs easier to port to different versions of OS/2.*



Our Standard Is Loaded.

When people asked for a 24-pin dot matrix printer that could handle just about anything, we went straight to work.

And we came back with four of them. The Toshiba P321SL, P321SLC, P341SL and P351SX. And we put in more useful features than any other printers in their class. Our fan-fold bypass, for instance, lets you print single sheets without having to unload your continuous form paper from the built-in tractor. And our simplified front panel makes printing as easy as touching a button.

There's even an optional automatic envelope feeder on our P351SX. All of which improve the way you handle paper. To improve the way you look on paper, our multistrike film ribbon produces dark, crisp type, no matter which model you buy. Our 360x360 dpi graphics offer a higher resolution than most laser printers. And you can do it all in color with our P321SLC. Or our P351SX with its optional color kit.

Also standard is a wide array of resident fonts and emulations for virtually all software. Not to mention our unsurpassed 24-pin print quality. All with a speed of up to 360 cps for draft and 120 cps for letter quality.

So call 1-800-457-7777 for the name of the Toshiba printer and computer dealer nearest you.

You'll find our input does wonders for your output.

P321SL/P321SLC *P341SL* *P351SX*

In Touch with Tomorrow

TOSHIBA

Toshiba America Inc., Information Systems Division

WinCreateStdWindow creates several windows, and what we think of as a program's main window on the screen really comprises these several windows. A window, as we'll see, is more precisely defined as an object that processes messages.

The title bar is a separate window. The program's menu bar, the system menu box at the left of the title bar, the minimize and maximize arrows to the right of the title bar, and the sizing border are all separate windows. A dialog box is a window. So is every button, scroll bar, and text entry field in the dialog box.

The WinCreateStdWindow function always creates a "frame window," which is the base on which the other windows are assembled. The creation of other windows is governed by the presence of identifiers beginning with FS ("frame style") in the second parameter to the function.

The FS_SIZEBORDER identifier indicates that the Presentation Manager should create a sizing border. This window is the same size as the frame window, but only the outer edges of the window are made visible. The FS_TITLEBAR identifier causes a title bar window to be created. The WinCreateStdWindow parameter described by the comment "title bar text" is the text that appears in the title bar. The FS_SYSMENU identifier directs the Presentation Manager to create a system menu; likewise, the FS_MINMAX identifier causes the creation of the minimize and maximize arrows.

Each of these windows processes keyboard and mouse input in its own unique way. By pressing the mouse button while the mouse pointer is positioned over the title bar, you can move the application's window around the screen. By pressing the mouse button while the pointer is positioned over the sizing border, you can change the window size. The WinCreateStdWindow function also creates an important window—the "client window." This window encompasses the entire area bounded on the left, right, and bottom by the visible part of the sizing border and on the top by the system menu, title bar, and minimize and maximize arrows.

The WinCreateStdWindow returns a handle to the frame window. You use this handle—a unique ID number—to refer to the window in subsequent Presentation Manager functions. In BOXES1.C, this handle is stored in hwndFrame. The function also returns a handle to the client window, which is stored in hwndClient.

Toward the end of `main`, before the program terminates, BOXES1 calls WinDestroyWindow to destroy the frame window. Destroying the frame window also destroys the other windows that were created with the frame window during the WinCreateStdWindow function.

THE MESSAGE LOOP Like all Presentation Manager programs, BOXES1 creates a message queue by calling the WinCreateMsgQueue function. A program must create a message queue before it creates a window. The presence of the message queue is what truly differentiates a Presentation Manager program from an OS/2 kernel program. The message queue is used mostly for storing keyboard and mouse input to all windows created by the program. This code in `main`

```
while (WinGetMsg (hab, &qmsg, NULL, 0, 0))
     WinDispatchMsg (hab, &qmsg) ;
```

is called a "message loop." During the WinGetMsg call the Presentation Manager fills in the fields of the QMSG structure with the next message from the message queue. The WinDispatchMsg function then sends the message to the window to which the message is addressed. The window then processes the message by a function known as the window procedure.

THE WINDOW PROCEDURE Every window has a window procedure (sometimes called the window proc) associated with it. When we say that "a message is sent to a window," we mean that this window procedure is called with parameters that describe the message. When we say that "a window processes a message," we mean that this window procedure interprets the message and acts upon it.

Where are these window procedures? In the case of BOXES1, the window procedures for the frame window, title bar window, sizing border window, system menu window, and minimize/maximize window are located in the Presentation Manager. The window procedure for the client window is located right in the program. It is the function named ClientWndProc ("client window procedure").

How does the Presentation Manager know that the function ClientWndProc is the window procedure for the client window created in the WinCreateStdWindow function? That's the purpose of the WinRegisterClass function. This function reg-

Presentation Manager Identifiers Recognized by OS/2

Identifier	Description
CS_SIZEREDRAW	Class style: Invalidate window when size changes
FALSE	0
FS_MINMAX	Frame style: Include minimize/maximize menu in standard window
FS_SIZEBORDER	Frame style: Include sizing border in standard window
FS_SYSMENU	Frame style: Include system menu in standard window
FS_TITLEBAR	Frame style: Include title bar in standard window
HWND_DESKTOP	Handle to the desktop window occupying the screen background
TRUE	1
WM_ERASEBACKGROUND	Window message: Return TRUE if frame window should paint itself
WM_PAINT	Window message: Update invalid area of the window
WM_SIZE	Window message: The window size has changed
WS_VISIBLE	Window style: Show window after it is created

Figure 7: *The identifiers defined by the header files reduce the numeric constants in OS/2 programs. BOXES1 uses those listed above.*

Ahead of its kind.

Introducing the Panasonic® Laser Partner™

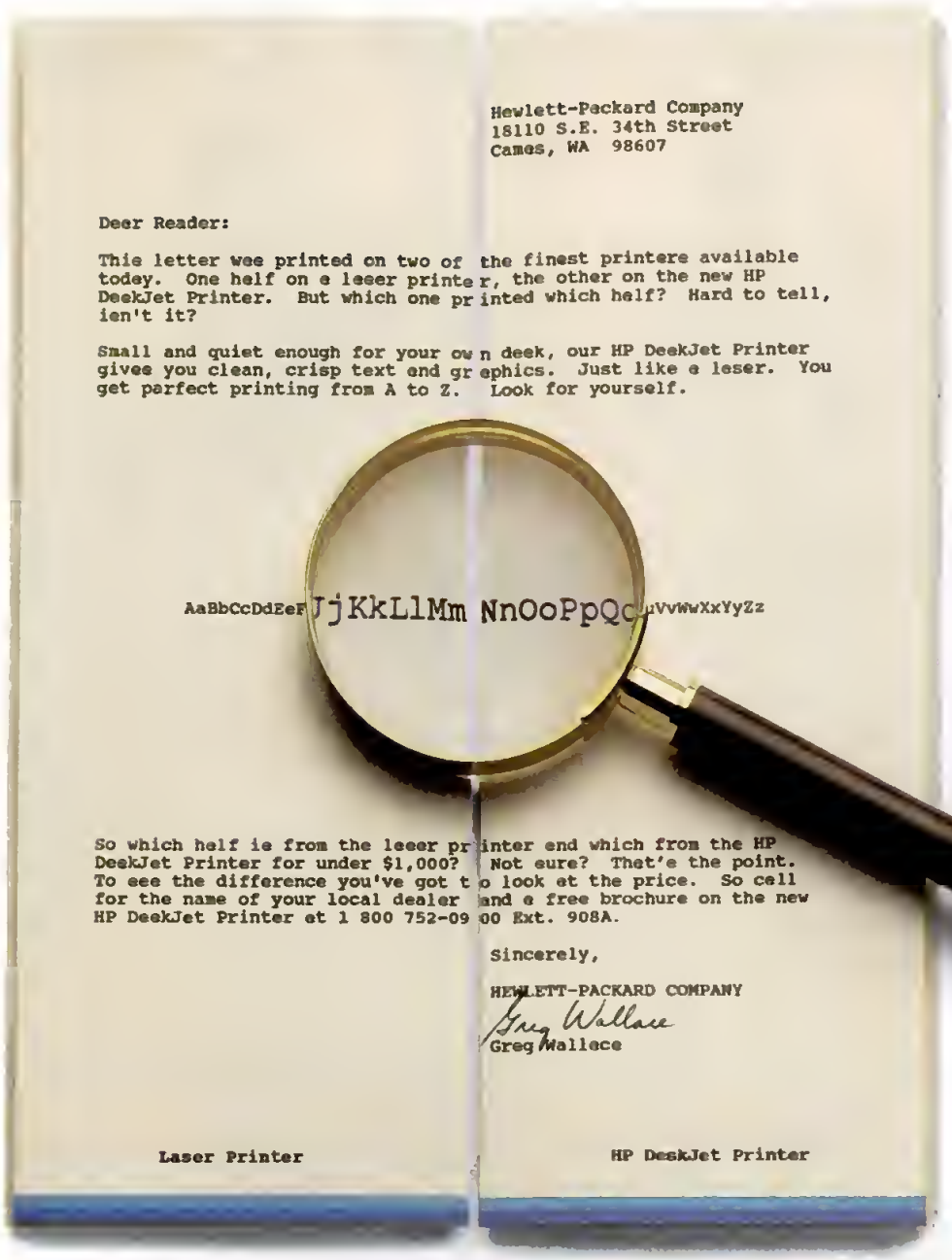
11 pages per minute (all originals, text) • Two paper cassettes • Optional envelope cassette • 11 built-in fonts.
Call for information or dealers: **1-800-PIC-8086.**

Panasonic
Office Automation OA

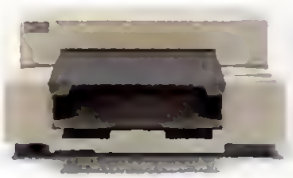
CIRCLE 119 ON READER SERVICE CARD

If you can see the difference, you must be looking at the price.

we never stop asking "What if..."



The New HP DeskJet Printer. Laser-Quality Output for Under $1000.



HEWLETT PACKARD

© Hewlett Packard Co 1987

CIRCLE 339 ON READER SERVICE CARD

■ ENVIRONMENTS

isters a window class with the name of "Boxes1." The window class name is then passed as a parameter to the WinCreateStdWindow function. The client window is said to be "based on" this class. All windows based on a particular class are associated with the same window procedure. The window procedure is specified as a parameter of WinRegisterClass.

When discussing the message loop, I said that the Presentation Manager stores messages that represent keyboard and mouse input in the message queue. These messages are retrieved from the queue by calling WinGetMsg and then sent to the appropriate window procedure by calling WinDispatchMsg.

But in other cases the Presentation Manager calls the window procedure directly. This is how the operating system communicates important events to the program—it sends the window a message by calling the window procedure. And this is what is so unusual about Presentation Manager architecture in comparison with traditionally structured operating systems. We're accustomed to calling operating system functions from our programs. But in the Presentation Manager, the operating system calls us!

PROCESSING MESSAGES Presentation Manager programs are "message driven." They sit around waiting for messages. Only when a window gets a message does it interpret and process it.

ClientWndProc processes messages sent to the client window. When the Presentation Manager calls a window procedure, it passes four parameters to it. The first parameter (hwnd) is a handle to the window. The second parameter (msg) is a number that identifies the message. The mp1 and mp2 parameters are "message parameters." These provide information specific to the particular message.

A window procedure generally processes messages using a switch statement. The Presentation Manager header files define identifiers beginning with the letters WM ("window message") to determine the message being sent.

In BOXES1, ClientWndProc processes three messages—WM_SIZE, WM_ERASEBACKGROUND, and WM_PAINT. After it processes one of these, the window procedure returns FALSE (0). All messages not processed by a window procedure must be sent back to the Presentation Manager via the WinDefWindowProc function. This function performs default message processing for all messages a window procedure chooses not to process.

You'll recall that we began with the question, "How does a program know when the user has resized its window?" The answer: the Presentation Manager sends the window a WM_SIZE message. That is, the Presentation Manager calls the

USE THIS PASSWORD AND SELL YOURSELF ON CHAIRMAN.

If you have a PC and a modem, call (516) 462-6638 and use the password on this page. See for yourself what the first true multiuser bulletin board software can do.

Find out why CHAIRMAN™ is the choice of hundreds of organizations, including *PC Magazine*—for its own popular Interactive Reader Service (up to 2,500 calls a day). *PC Magazine* writes about CHAIRMAN: "For flexibility, speed, ease of setup, security, and company support, you can't go wrong."

SET UP YOUR OWN BULLETIN BOARD

With CHAIRMAN's unique multiuser capability, six callers can simultaneously access a bulletin board on one PC.

CHAIRMAN is the perfect answer for anyone who wants to *distribute* data on a timely basis, *collect* data from numerous sources, or do both. It handles electronic mail needs at a fraction of the cost of the expensive services, such as MCI Mail,™ The Source,™ and Compuserve.™ Conduct electronic surveys, get questionnaires answered online, send price and delivery information to salespeople, find out support call details without tying up your staff, transfer binary and ASCII files, send software updates to your users, etc.

Combine CHAIRMAN with DMA's FORMULA IV, *PC Magazine* Editor's Choice in DBMS, to use your bulletin board for interactive database applications. CHAIRMAN is available in six-user, two-user, single-user, and network versions. A two-user demo is available for $25 + $5 S&H.

For more information, call (212) 687-7115 or write to: DMA, 545 Fifth Avenue, New York, NY, 10017. Ask about our volume discounts.

MCI Mail, The Source, Compuserve are trademarks of their respective companies. Chairman and FORMULA IV are trademarks of DMA, Inc.

THE FIRST TRUE MULTIUSER BULLETIN BOARD

DMA

CIRCLE 330 ON READER SERVICE CARD

window procedure with the msg parameter set to 7, which is the value that defines the identifier WM_SIZE. The old size of the window (in units of pixels) is encoded in the message parameter mp1. The new size of the window is encoded in mp2.

ClientWndProc processes the WM_SIZE message by extracting the new width and height of the window from mp2 using the SHORT1FROMMP and SHORT2FROMMP macros. The new width is saved in the variable xClient and the height is saved in the variable yClient. These two variables are defined as static because they must be used later while processing subsequent messages.

The first time ClientWndProc receives a WM_SIZE message is during the call to WinCreateStdWindow. The Presentation Manager creates the client window and then informs ClientWndProc of the window size by sending it a WM_SIZE message. ClientWndProc receives other WM_SIZE messages whenever the user changes the size of the window.

PAINTING THE CLIENT One of the most important messages processed by a window procedure is WM_PAINT. It informs the window procedure that the window needs to be repainted. More specifically, the message indicates that an area of the window on the screen has become "invalid" and no longer displays what the program originally put there.

How does part of a window become invalid? This can happen in several ways. When the window is first created, the whole area of the window is invalid and must be painted. When part of a window is moved off the screen, or when one window overlaps another, the Presentation Manager will usually not attempt to save the hidden area of the window. And when that area is moved back into view, it is an invalid area. This causes a WM_PAINT message to be sent to the window procedure so that the window can be updated.

A window procedure also receives a WM_PAINT message when the window changes size. The WM_PAINT message occurs after the WM_SIZE message. Thus, by the time the window procedure begins painting the window, it knows the new window size and can paint based on that size. This is what BOXES1 does.

IBC has your computer replacement batteries.

In fact, that's our specialty. We are the world's largest supplier of computer batteries for IBM AT, PS2, and all other computers. So when your battery does start to die, IBC is ready to save your day. And keep *you* from being stranded. By delivering your replacement battery within 24 hours. All you have to do is pick up the phone and call us.

When do you need a new battery? Well, you can tell that time is running out when the clock and calendar begin to slow down. If you have an IBC battery on hand—and it makes sense because the shelf life of our batteries is *10 years*—your battery slowdown won't slow *you* down! With an IBC battery handy, you don't miss a beat when your present battery starts to go.

But do you have to wait until you're in an emergency situation to order your PC AT battery? Not at all. In fact, you can save the hassle of downtime and reconfiguration by changing your battery once a year. And in the process, avoid the frustration of an idle computer while you wait for a new battery.

So put us on your emergency phone list. And when your vital signs are fading, give us a call. Remember, we're your source for computer batteries. We want to keep you running!

ORDER NOW!
800/654-3790 (US)
800/225-9359 (CA)
Price only $27.50

- **Dealer inquiries welcome.**
- **Corporate discounts available.**

Tadiran, Panasonic, Varta, Saft, and Rayovac batteries are available for IBM AT, PS2, Compaq, AT&T, and all other clones and compatibles. Checks, money orders, and credit cards welcome. Add $3.00 for shipping and handling. ($14.00 for overnight shipping.)

IBC
Your number one source for all computer batteries.

International Battery Corporation
16735 Saticoy Street, Suite 111
Van Nuys, CA 91406
818/781-7515, FAX 818/781-7804

All trademarks acknowledged.

CIRCLE 269 ON READER SERVICE CARD

34,001-2-3s.

Lotus® 1-2-3® from Software Spectrum. More than 34,000 of our customers count on it.

At Software Spectrum, we'd like to think we've done our part to help establish Lotus 1-2-3 as the undisputed standard in business management software.

You see, we've sold more than 34,000 copies of 1-2-3 to corporate and government users. And although we don't sell or trade by mail order, our high volume allows us to sell each copy at a much lower price.

Right now, for example, we're offering Release 2.01 of 1-2-3 for just $279. But there's more to Software Spectrum than a bargain price. Because from same-day shipping to knowledgeable, professional salespeople, you'll find Software Spectrum is the most reliable, responsive source in the industry.

So if you'd like to become more productive with numbers, join the millions of smart businesspeople who use Lotus 1-2-3. Or, better yet, join the 34,000 really smart people who bought their 1-2-3 from Software Spectrum. Just call 1-800-624-0503* to find out more or to open a corporate account.

SOFTWARE SPECTRUM

10420 Miller Road, Dallas, Texas 75238, (214) 349-0400.
*In Illinois, Indiana, Michigan or Wisconsin call 1-800-445-6454.

Lotus and 1-2-3 are registered trademarks of Lotus Development Corporation.

CIRCLE 234 ON READER SERVICE CARD

A Computer "Book" That Will Never Be Outdated

The problem with most books about public domain and shareware software is that they are usually outdated before they leave the printer.

To overcome this problem, we put the definitive Guide to Public Domain and Shareware Software on disk. This makes it easy for us to keep it updated monthly, and you can get free updates by returning the disks to us.

The Public (Software) Library has for years been acclaimed by the national press as the most up-to-date, best organized library of PD/shareware available and this is reflected in the Guide.

But the Guide is much more than a catalog of the disks in the PsL. It is arranged by subject, from Accounting, Communications and Database to Statistics, Utilities and Word Processing.

Each section leads you to the specific type of software you need to solve your problems and then presents reviews of each of those programs.

Then you can order the disks for only $5 each. Public domain programs require no other fee. The registration price for shareware programs is normally in the range of $5 to $50.

You can order the *Guide* now for just $10, or you can find out more about the PsL by calling or writing for a FREE sample of our monthly newsletter and complete listing of disks in the library.

PUBLIC *(software)* LIBRARY

P.O. Box 35705 - PG
Houston, TX 77235-5705
713-721-5205 or 713-721-6104
MC/Visa Accepted

CIRCLE 529 ON READER SERVICE CARD

Three ways to build better Turbo Pascal programs...

NEW! POWER SCREEN $129

Screen I/O manager.
Features: ◆ screen painter ◆ virtual screens ◆ data validation ◆ context sensitive help ◆ unlimited screens ◆ definable keys ◆ & much more!

POWER TOOLS PLUS $129

Full featured function library.
Features: ◆ TSR support ◆ direct video access ◆ VGA and EGA support ◆ windows and menus ◆ DOS memory allocation ◆ interrupt service routines ◆ & much more!

ASYNCH PLUS $129

Asynchronous communication manager.
Features: ◆ speeds to 19.2K baud ◆ XON/XOFF protocol ◆ hardware handshaking ◆ XModem file transfer ◆ I/O buffers up to 64K ◆ & much more!

We're Blaise Computing, manufacturers of high quality function libraries designed to reduce the time and technical expertise required for serious applications development.

All of these packages include Peter Norton's Online Instant Access Program, a comprehensive user reference manual with extensive examples, and full sample programs.

Satisfaction guaranteed or return within 30 days for a full refund.

We have a full line of products for C and Pascal. For a free brochure or to order call

800-333-8087!

BLAISE COMPUTING INC.
2560 Ninth Street, Suite 316 Berkeley, CA 94710 (415) 540-5441

CIRCLE 116 ON READER SERVICE CARD

■ ENVIRONMENTS

PROCESSING WM_PAINT Usually the processing of the WM_PAINT message begins with a call to WinBeginPaint:

```
hps = WinBeginPaint (hwnd, NULL, NULL) ;
```

This function returns a handle to a "presentation space." You need this handle to display anything on the window's surface. The presentation space handle is the first parameter to all the GPI graphics-drawing functions. GPI will clip graphics output on the window's surface—you can't draw outside your window even if you try.

A window procedure wraps up WM_PAINT processing with a call to WinEndPaint:

```
WinEndPaint (hps) ;
```

This has the effect of validating the entire surface of the window.

DRAWING LINES BOXES1 processes the WM_PAINT message by drawing a series of rectangles in its client window. The two functions it uses are GpiMove and GpiPolyLine.

You specify a coordinate point in GPI functions using a POINTL structure. The POINTL structure is defined in an OS/2 header file as follows:

```
typedef struct _POINTL
        {
        LONG x ;
        LONG y ;
        }
        POINTL ;
```

Thus a POINTL structure has two fields, called *x* and *y*, that are signed long (32-bit) integers. By convention, when you define a variable of type POINTL, you give the variable name a prefix of ptl:

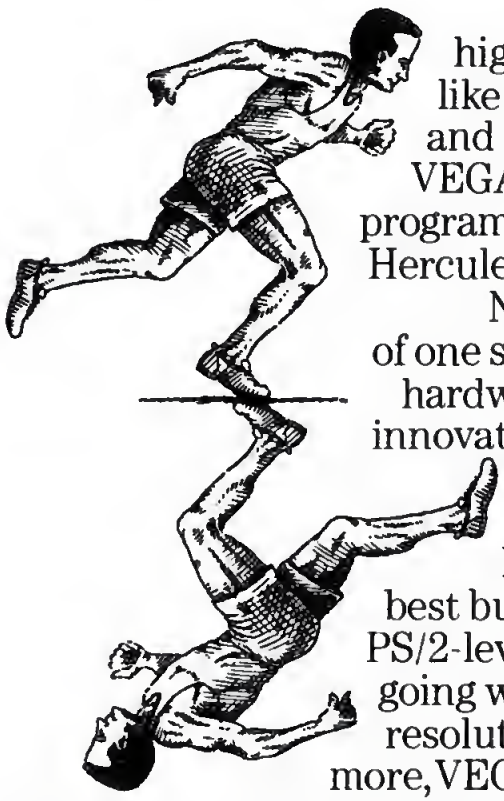
```
POINTL ptlLowerLeft ;
```

Again by convention, the variable name for an array of POINTL structures begins with the letters aptl.

By default, the GPI coordinate space has an origin at the lower-left corner of the window. Values of *x* on the horizontal axis increase to the right; values of *y* increase going up. The units are pixels. (You can also use a coordinate system based on inches or millimeters if you wish.)

The GpiMove function does not draw anything. Instead it sets the "current posi-

How To Run Backwards & Forwards At The Same Time.



If your search for a totally compatible, high performance graphics card has felt a little like going in all directions at once, why not stop and take a breather. Because not only will VEGA VGA run all *current and future* VGA programs, it's also compatible with EGA, CGA, MDA, Hercules and even OS/2. Guaranteed.

Notice we said guaranteed. That's because of one simple fact: VEGA VGA is compatible, on a hardware level, with the IBM VGA. Just the sort of innovation you'd expect from the leader of the pack in graphics technology, Video Seven.

But VEGA VGA does much more than just keep pace with your software. It gives you the best business graphics available, in effect bringing PS/2-level performance to a regular PC. That means going well beyond standard VGA, with 800 x 600 resolution and up to 256 on-screen colors. What's more, VEGA VGA runs on any IBM PC monitor—analog, digital, color or monochrome. Finally, we protect your investment with toll-free technical support and a full five year limited warranty.

So don't wait. Visit your nearest Video Seven dealer today and find out more about VEGA VGA. It could take you in the best direction of all—to the top.

Video Seven Inc., 46335 Landing Parkway Fremont, CA 94538. 1-800-238-0101 (in California, 1-800-962-5700.)

The following are registered and unregistered trademarks of the companies listed Video Seven VEGA VGA, Video Seven Inc., EGA, CGA, MDA, PS/2, OS/2, International Business Machines Corporation, Hercules, Hercules Computer Technology, Inc Analog monitor needed to support 262,144 palette and 256 colors. Variable frequency monitor required for greater than 640 x 350 resolution Video Seven reserves the right to change specifications without notice

VIDEO SEVEN

We make a clear difference.

CIRCLE 127 ON READER SERVICE CARD

tion" to the point indicated by the POINTL parameter to the function. The GpiPolyLine function then draws a series of lines (in BOXES1, four lines) starting from the current position.

ONE WINDOW TO ANOTHER Messages also allow windows to communicate among themselves. In BOXES1 this occurs with the WM_ERASEBACKGROUND message. The frame window sends this message to the client window. The message essentially says, "I (the frame window) have just received a WM_PAINT message. Do you want me to paint my window, thus effectively erasing the background of the client window?"

The client window can respond to this message in one of two ways. If the client window procedure returns FALSE (a zero value), the client window is essentially saying, "No, thanks. I'll erase the background of my window myself." If the window procedure returns TRUE, it's telling the frame window, "Sure. Go ahead."

If the client window does *not* process the WM_ERASEBACKGROUND message, then the message is passed to the WinDefWindowProc function. In response to the WM_ERASEBACKGROUND message, WinDefWindowProc returns FALSE to ClientWndProc and ClientWndProc then returns FALSE to the frame window. The default processing of WM_ERASEBACKGROUND is for the frame window not to color itself when it gets a WM_PAINT message.

TERMINATION We've seen how the structure of BOXES1 allows the program to adjust the contents of its client window based on the size of the window. Whenever the size is changed by a user, ClientWndProc receives a WM_SIZE message followed by the messages WM_ERASEBACKGROUND and WM_PAINT. Whenever part of the window becomes invalid for other reasons, the client window receives WM_ERASEBACKGROUND and WM_PAINT messages and simply recreates what was there before. The program is structured around the processing of these messages.

All other messages to the client window are processed by WinDefWindowProc. One example of how this works is seen during the termination of a program.

A Presentation Manager program can be ended by selecting the Close option from the system menu. The frame window processes the command and then sends a WM_CLOSE message to the client window. If the client window procedure chose to process the WM_CLOSE message, it could ask the user for confirmation if any work had not yet been saved to disk. WinDefWindowProc processes the WM_CLOSE message by placing a WM_QUIT message in the program's message queue.

You'll recall this message loop in main:

```
while (WinGetMsg (hab, &qmsg, NULL, 0, 0))
     WinDispatchMsg (hab, &qmsg) ;
```

For most messages the WinGetMsg function returns a nonzero value. For the WM_QUIT message, however, WinGetMsg returns zero. This causes the loop to end. The program then calls WinDestroyWindow, WinDestroyMsgQueue, and WinTerminate and terminates normally.

TWO MORE FILES Two other files are required for compiling BOXES1. One of these files is the "make file" shown in Figure 8. You compile and link BOXES1 with the command

```
MAKE BOXES1
```

MAKE reads the make file and compares the date and time of the file indicated to the left of the colon (the target file) with the date and time of the file or files to the right of the colon (the source files). If any of the source files have been changed more recently than the target files, MAKE runs the indicated command.

Presentation Manager programs often use MAKE because the compiler switches available are more complex than normal and (as we'll see in the next issue) creating a Presentation Manager program usually requires a few additional steps beyond just compiling and linking the C source code file.

Another file required for Presentation Manager programs is in the "module definition file." The BOXES1.DEF file is shown in Figure 9. This file is read by LINK when linking the program and contains information that LINK needs to construct the .EXE file. Note in particular the EXPORTS statement in BOXES1.DEF—this statement must list all the window procedures in the program.

NEXT STEP: A MENU In the next issue we'll upgrade the program to include a menu and call the program BOXES2. The menu will allow selecting colors for the background and for the lines displayed in the client window.

```
#------------------
# BOXES1 make file
#------------------

boxes1.obj : boxes1.c
     cl -c -G2sw -W3 -Zp boxes1.c

boxes1.exe : boxes1.obj boxes1.def
     link boxes1, /align:16, NUL, os2, boxes1
```

Figure 8: *The BOXES1 make file.*

```
;----------------------------------
; BOXES1.DEF module definition file
;----------------------------------

NAME           BOXES1     WINDOWAPI

DESCRIPTION    'Draws boxes in client window (c) 1988, Ziff Communcations Co.'
PROTMODE
HEAPSIZE       1024
STACKSIZE      8192
EXPORTS        ClientWndProc
```

Figure 9: *The BOXES1.DEF module definition file.*

Some of the perfectionists at WordPerfect who helped design DataPerfect 2.0.

Introducing the database designed to please a bunch of perfectionists.

We're not easily satisfied at WordPerfect, a fact that's worked to our advantage. After all, it was our high standards that helped us to produce the world's leading word processor.

But those same high standards made it difficult to find an acceptable database for use at our headquarters. So we built our own.

Introducing DataPerfect® 2.0, the WordPerfect®-compatible database that's now available for perfectionists everywhere.

Our people wanted power, speed and ease-of-use. DataPerfect is powerful enough to create accounting and payroll applications, allowing simultaneous network access to all records and files. It offers rapid look-up capabilities, even when thousands of records are involved. Providing the speed to manage our huge databases efficiently. And, with DataPerfect's menu-driven system, we can now define a database in a matter of hours.

We think DataPerfect is the database for the most hard-nosed perfectionists. So if your standards are as high as ours, it's made to order for you.

For more information, call or write WordPerfect Corp., 1555 North Technology Way, Orem, Utah 84057. (801) 225-5000.*

DataPerfect® from WordPerfect

*In Canada, call 1-800-267-2499. WordPerfect and DataPerfect are registered trademarks of WordPerfect Corporation. All other brand and product names are trademarks or registered trademarks of their respective companies.

CIRCLE 508 ON READER SERVICE CARD

The best thing next to an IBM PC. Or any PC.

Model 310/360

The economics of IBM ASCII displays.

The affordable Models 310 and 410, when equipped with cartridges, offer PC terminal function for all multi-user PCs. That includes the IBM® RT-PC™ computer and the IBM PS/2™ family.

What's more, Models 310 and 410 offer many popular emulations. Optional cartridges provide features such as concurrent DEC™ and PC connectivity, and auto dial. Both models come with a 3-year warranty. Add an IBM Maintenance Agreement, and you'll get five years of IBM service for just $54.

The ergonomics of IBM ASCII displays.

They're not only economically attractive, they're easy to look at. Flat 14" screens offer non-glare viewing. Green or amber/gold short-persistence phosphors produce crisp character resolution. And each model uses the advanced 102-key IBM keyboard.

Model 410/460

"Want more information? Just ASCII."

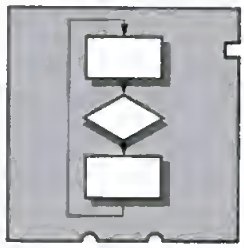
For a free brochure and to find a distributor near you, call 1-800-IBM-7257 ext. 89. Or call your IBM Marketing Representative.

IBM®

IBM is a registered trademark, and PS/2 and RT-PC are trademarks, of IBM Corporation. DEC is a trademark of Digital Equipment Corporation. © IBM 1988

■ POWER PROGRAMMING ■ RAY DUNCAN

KEEPING FILENAMES FULLY QUALIFIED



Programs that use incomplete filenames and let users change drives and subdirectories can be trouble. This routine converts incomplete file specifications into fully qualified filenames.

An MS-DOS system can contain many files with the same name and extension, provided the files are in different locations. MS-DOS requires only that each file be uniquely specified by the combination of a drive, path, name, and extension, in the form

```
d:\path\name.ext
```

The path can consist of one or more directory names, starting with the disk's root directory and separated by backslash (\) characters. A file specification of this sort, which unambiguously identifies one file out of all the files in the system, is called a *fully qualified filename*.

If you had to enter fully qualified names whenever you wanted to work with a file, your patience would be exhausted in about 5 minutes—especially if you are in the habit of organizing your files in a neat, multilevel tree directory structure. Fortunately, MS-DOS uses the concepts of a "current disk" and a "current directory" for each disk in the system. Whenever you enter a filename that omits the drive specifier or does not include a full path, MS-DOS fills in the missing information according to your current disk and directory.

The ability to use "locality" as an implicit part of a filename is a tremendous convenience from the user's point of view, but it can be a nasty trap for the program-

```
        name    qfn
        title   QFN.ASM --- qualify file name
        page    55,132
;
;
; QFN.ASM -- Qualify File Name
;
; Copyright (C) 1988 Ziff Davis
; by Ray Duncan Feb. 1988
;
; Call with:    DS:SI = filename address
;               AX    = length
;
; Returns:      Carry = clear if filename OK
;               DS:SI = qualified filename
;               AX    = length
;               or
;               Carry = set if bad filename
;
;               Registers other than DS:SI
;               and AX are preserved.
;

DGROUP  group   _DATA

_DATA   segment word public 'DATA'

cdrive  db      0               ; current drive
cpath   db      '\',64 dup (0)  ; current directory

tbuff   db      64 dup (0)      ; target directory

qbuff   db      'X:\'           ; qualified pathname
        db      64 dup (0)

fname   dw      ?               ; filename address
flen    dw      ?               ; filename length

_DATA   ends

_TEXT   segment word public 'CODE'

        assume  cs:_TEXT,ds:DGROUP

        public  qfn             ; make visible to Linker

qfn     proc    near            ; qualify file name

        push    bx              ; save registers
        push    cx
        push    dx
        push    di
        push    es

        mov     flen,ax         ; save length and
        mov     fname,si        ; address of filename

        mov     ax,ds           ; make DGROUP addressable
        mov     es,ax           ; with ES register

                                ; save current drive...
        mov     ah,19h          ; fxn 19h = get drive
        int     21h             ; transfer to MS-DOS
        mov     cdrive,al       ; save it

                                ; save current directory...
                                ; DS:SI = buffer
        mov     si,offset DGROUP:cpath+1
        mov     ah,47h          ; fxn 47h = get directory
        mov     dl,0            ; drive = current
        int     21h             ; transfer to MS-DOS

                                ; did caller specify drive?
```

(continues)

Figure 1: *The source code for QFN.ASM, a subroutine that converts an incomplete file specification into a fully qualified filename.*

■ POWER PROGRAMMING

mer. Suppose, for example, you prompt the user for a filename and he enters

```
myfile.dat
```

Opening the file is no problem: MS-DOS will know that you mean myfile.dat in the current directory of the current drive. Filenames with "relative paths" like

```
d:subdir\myfile.dat
```

or even

```
d:..\subdir\myfile.dat
```

are no trouble either: MS-DOS can still find the file for you.

Suppose, however, that you also provide the user with a way of changing the current directory and/or current drive from within the program. If you store away one of these incomplete filenames for later use and the user subsequently switches to a new drive or directory, your program may not be able to open the file anymore or (worse yet) may open the wrong file.

■ The ability to use "locality" as an implicit part of a filename can be a nasty trap for the programmer.

Obviously then, what we need is a subroutine to convert an incomplete file specification into a fully qualified filename that can be safely used at any time during a program's execution. The QFN.ASM listing in Figure 1 is such a routine.

USING THE QFN ROUTINE QFN is called with the address of a file specification in registers DS:SI and the length in register AX. If the file specification includes a drive code, QFN makes sure that the drive exists. If no drive code is present, QFN adds the identifier for the current drive. Similarly, if a full path is included, QFN makes sure that the path actually exists. If the path is incompletely specified or missing altogether, QFN expands the path using the current directory of the current or specified drive.

If the drive and path components can be successfully resolved to an actual, valid disk and directory in the system, QFN returns the Carry flag cleared (0). The address and length of the fully qualified filename are returned in registers DS:SI and AX, respectively. If the drive or path do not exist, QFN returns the Carry flag set (1). The contents of registers other than DS, SI, and AX are always preserved.

QFN does not make any attempt to determine whether a particular file exists—only whether the specified or implicit location for the file is feasible. Thus, the rou-

```
        mov     di,fname        ; get address of name
        mov     cx,flen         ; get length of name

        cmp     cx,2            ; if drive, length must
                                ; be >= 2 chars.
        jl      qfn2            ; too short, no drive

                                ; check for drive delimiter
        cmp     byte ptr [di+1],':'
        jne     qfn2            ; no delimiter, jump

        mov     dl,[di]         ; get ASCII drive code
        or      dl,20h          ; fold to lower case
        sub     dl,'a'          ; convert it to binary
        mov     ah,0eh          ; fxn 0eh = select drive
        int     21h             ; transfer to MS-DOS

                                ; get current drive to
                                ; make sure drive selected
        mov     ah,19h          ; fxn 19h = get current drive
        int     21h             ; transfer to MS-DOS
        cmp     dl,al           ; current = requested?
        je      qfn1            ; jump if select succeeded
        jmp     qfn0            ; exit, select failed

qfo1:   add     di,2            ; bump pointer past drive
        sub     cx,2            ; and decrement length

qfn2:                           ; save current directory
                                ; equiv for new drive...
                                ; DS:SI = buffer
        mov     si,offset DGROUP:cpath+1
        mov     ah,47h          ; fxn 47h = get directory
        mov     dl,0            ; drive = current
        int     21h             ; transfer to MS-DOS

                                ; scan off path if any
        push    di              ; save start of path
        mov     al,'\'          ; path delimiter

qfn3:   mov     fname,di        ; save path pointer
        mov     flen,cx         ; save path length
        jcxz    qfn4            ; jump if none left

        repne scasb             ; any '\' left in path?
        je      qfn3            ; loop if '\' found

qfn4:   pop     si              ; recover starting address
                                ; of path portion

                                ; copy path to local buffer
                                ; and make it ASCIIZ...
        mov     di,offset DGROUP:tbuff
        mov     cx,fname        ; calculate path length
        sub     cx,si
        js      qfn6            ; jump, no path at all
        cmp     cx,1            ; root directory?
        je      qfn5            ; jump if root
        dec     cx              ; else discard last '\'

qfo5:   rep movsb               ; transfer path and
        xor     al,al           ; append null byte
        stosb

                                ; now make target directory
                                ; the current directory...
        mov     dx,offset DGROUP:tbuff
        mov     ah,3bh          ; fxn 3BH = select directory
        int     21h             ; transfer to MS-DOS
        jc      qfn0            ; jump, no such directory

qfn6:                           ; build up full pathname...

        mov     ah,19h          ; get current drive
        int     21h             ; transfer to MS-DOS
        add     al,'A'          ; convert binary to ASCII
        mov     qbuff,al        ; store ASCII drive code

                                ; get current directory
        mov     dl,0            ; DL = 0 for default drive
                                ; DS:SI = buffer address
        mov     si,offset DGROUP:qbuff+3
        mov     ah,47h          ; fxn 47h = get current dir
        int     21h             ; transfer to MS-DOS
        jc      qfn0            ; jump if error

                                ; point to path component
        mov     di,offset DGROUP:qbuff+3
```

(Figure 1 continues)

It's small, dependable and very affordable. But this time, it's called Spark,™ the incredible laptop computer from Datavue.™

This 9 lb. machine runs at 9.54 MHz and is packed full of features. Like 384K of memory, 3.5″ microdrive, super-twisted crystal LCD screen, IBM® compatibility, and a built-in handle. Other models are also available with 640K memory, dual disk drives, long-life battery and back-lit screen.

History does repeat itself. Spark proves it. For more information contact us at One Meca Way, Norcross, GA 30093 (404) 564-5555.

DATAVUE™

CIRCLE 313 ON READER SERVICE CARD

It's been 33 years since you could get a deal like this.

$995

Datavue and Spark are trademarks of Datavue Corporation. IBM is a registered trademark of International Business Machines Corporation. Price is subject to change without notice.

■ POWER PROGRAMMING

```
        cmp     byte ptr [di],0 ; is current directory
                                ; the root directory?
        je      gfn7            ; yes, jump

        xor     al,al           ; scan for null byte at
        mov     cx,-1           ; end of path name
        repne scasb             ; and append backslash
        mov     byte ptr [di-1],'\'

gfn7:                           ; now append filename
                                ; to drive and path...
        mov     si,fname        ; filename address
        cmp     byte ptr [si],'.'
        je      gfn8            ; wait if directory alias
        mov     cx,flen         ; filename length
        rep movsb               ; copy it

                                ; set DS:SI = address
        mov     si,offset DGROUP:gbuff
        mov     ax,di           ; and AX = length of
        sub     ax,si           ; fully qualified filename

        call    makelc          ; fold filename to lower
                                ; case to make it pretty

        clc                     ; Carry = false to
                                ; indicate success

        jmp     gfn9            ; jump to common exit

gfn8:                           ; come here if any
                                ; error detected...

        stc                     ; Carry = true to
                                ; indicate error

gfn9:   pushf                   ; save Carry flag
        push    ax              ; save final length

                                ; restore original directory
        mov     dx,offset DGROUP:cpath
        mov     ah,3bh          ; fxn 3BH = select directory
        int     21h             ; transfer to MS-DOS

        mov     dl,cdrive       ; restore original drive
        mov     ah,0eh          ; fxn 0EH = set drive
        int     21h             ; transfer to MS-DOS

        pop     ax              ; restore length
        popf                    ; and Carry flag

        pop     es              ; restore other affected
        pop     di              ; registers
        pop     dx
        pop     cx
        pop     bx

        ret                     ; back to caller

qfn     endp


makelc  proc    near            ; string -> lower case
                                ; DS:SI = address
                                ; AX = length

        push    bx              ; save BX contents
        xor     bx,bx           ; BX will be pointer
elc1:                           ; change A-Z to a-z
        cmp     byte ptr [bx+si],'A'
        jb      elc2
        cmp     byte ptr [bx+si],'Z'
        ja      elc2
        or      byte ptr [bx+si],20h

mlc2:   inc     bx              ; advance through string
        cmp     bx,ax           ; done with string yet?
        jne     mlc1            ; no, check next char.

        pop     bx              ; restore BX and
        ret                     ; return to caller

makelc  endp

_TEXT   ends

        end
```

(Figure 1 ends)

```
        name    trygfn
        title   TRYQFN -- QFN demo
        page    55,132

;
; TRYQFN.ASM --- demo of QFN routine
;
; Ray Duncan, February 1988
;

cr      equ     0dh             ; ASCII carriage return
lf      equ     0ah             ; ASCII line feed

stdin   equ     0               ; standard input handle
stdout  equ     1               ; standard output handle
stderr  equ     2               ; standard error handle


DGROUP  group   _DATA

_DATA   segment word public 'DATA'

ibuff   db      80 dup (0)      ; input buffer

msg1    db      cr,lf,lf
        db      'Enter filename:
msg1_len equ $-msg1

msg2    db      cr,lf
        db      'The full pathname is:
msg2_len equ $-msg2

msg3    db      cr,lf
        db      'Bad filename!'
msg3_len equ $-msg3

_DATA   ends


_TEXT   segment word public 'CODE'

        extrn   qfn:near

        assume  cs:_TEXT,ds:DGROUP

main    proc    near

        mov     ax,_DATA        ; make our data segment
        mov     ds,ax           ; addressable...
        mov     es,ax

main1:                          ; display prompt...
                                ; address of message
        mov     dx,offset DGROUP:msg1
        mov     cx,msg1_len     ; length of message
        mov     bx,stdout       ; standard output handle
        mov     ah,40h          ; function 40h = write
        int     21h             ; transfer to MS-DOS

                                ; get a filename...
                                ; address of buffer
        mov     dx,offset DGROUP:ibuff
        mov     cx,64           ; maximum entry length
        mov     bx,stdin        ; standard input handle
        mov     ah,3fh          ; function 3fh = read
        int     21h             ; transfer to MS-DOS
```

(continues)

Figure 2: *The source code for TRYQFN.ASM, a program that demonstrates the QFN routine.*

"Just Released for OS/2— SuperProject Expert/2"

New... SuperProject Software What The Experts Have To Say:

Aerospace: *"SuperProject is the best. Earned Value Reporting and Work Breakdown Summarization give me complete project control and the graphics make impressive presentations."* **Barry Feeley,** Technical Manager, Ford Aerospace.

Construction: *"The familiar SuperCalc® and 1-2-3 menu system makes it really easy to learn and use. It handles multiple projects, networking and flexible report writing. The multiple resource calendars and histograms manage resources very efficiently."* **Ted Ritter,** CEO, O'Connor Construction Co.

Data Processing: *"The Outliner allows me to quickly sketch critical schedules from the top down. Expert is way ahead of the pack."* **D.W. Nesper,** Regional Consulting Manager, Wang Labs.

The SuperProject® Family—Plus, Expert and Expert/2—is the most advanced PC project management software available. The smallest to the largest and most complex projects imaginable are easily handled thanks to its virtual memory management skills.

Newly released SuperProject Expert/2 running under OS/2, gives you true multitasking. For example, this enables you to enter data in the foreground while outputting a report in the background.

And only Computer Associates gives you PC *and* mainframe project management. Develop your project planning on a PC and then upload to a mainframe with CA-PLANLINKS™. You can then consolidate that project with others via CA-TELLAPLAN™ and take advantage of its resouree pooling and presentation graphies.

The SuperProject Series

FEATURES	SUPERPROJECT PLUS	EXPERT	EXPERT 2
PERT, Gantt Diagram w/CPM	Yes	Yes	Yes
Outline Work Breakdown Chart	Yes	Yes	Yes
Resource Histogram	Yes	Yes	Yes
Resource Leveling	Yes	Yes	Yes
Tasks Per Project (Max)	1,560	1,560	Unlimited
Mainframe Link	Yes	Yes	Yes
Calendars	Yes	Yes	Yes
Export Import (Partial or All)	Yes1	Yes	Yes
Multi-Project Resource Pooling		Yes	Yes
Built-in Graphics Output		Yes	Yes
Networking		Yes	Yes
Plotter Support		Yes	Yes
Multitasking			Yes

[1]Exporting only [2]When LAN Mgr is available

For your free demo diskette or more information, call 800-533-2070 (Ad 54907). In Canada: 1-800-663-6904

Computer Associates
1240 McKay Drive, San Jose, CA 95131

© 1988 Computer Associates International, Inc.

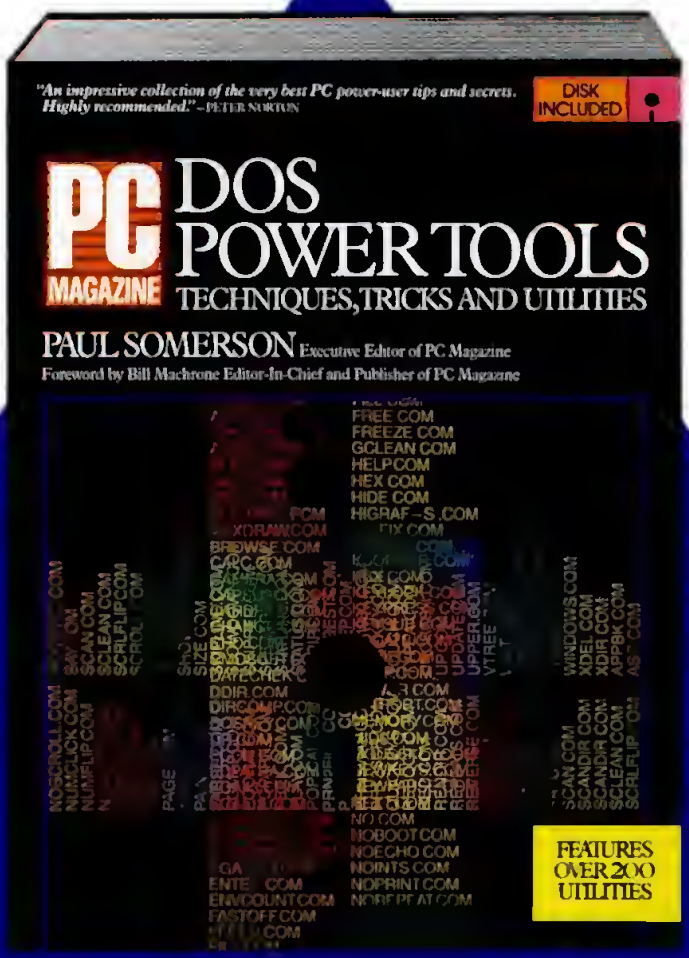
COMPUTER ASSOCIATES™
Software superior by design.

- World's leading independent software company.
- Broad range of integrated business and data processing software for mainframe, mid-range and micro computers.
- Worldwide service and support network of more than 70 offices.

Accounting • Spreadsheets • RDBMS • Graphics • Project Management • Resource & Operations Management

CIRCLE 251 ON READER SERVICE CARD

TAP THE HIDDEN POWER IN YOUR PC



Every DOS system—versions 1.0 through 3.3—can run faster and more effectively with the undocumented tricks and practical utilities included in this powerful book-and-disk package. Paul Somerson, *PC Magazine*'s Executive Editor, has gathered together 1,200 pages of ingenious tips—help that no PC owner should be without. Included is a disk with over 200 ready-to-run utilities. Increase your computing power with:

- Many new DOS enhancements
- Utilities that automate hard disk and file management
- Techniques to streamline screen and printer control
- Easy-to-use programs for pop-up calendars, phone dialers, card files, appointment books, and graphic enhancers
- Tips on taming DEBUG, ANSI, and EDLIN
- Advanced batch file techniques
- Environment and memory wizardry

"An impressive collection of the very best PC power-user tips and secrets. Highly recommended."
–Peter Norton

"A fabulous work, in a league by itself. It has found a permanent spot in my reference library.... A must buy!"
–John Dvorak

CIRCLE 505 ON READER SERVICE CARD

Available wherever computer books are sold, or call toll-free (800) 223-6834, extension 9479. In New York State, Alaska, or Hawaii, call (212) 492-9479.

BANTAM ELECTRONIC PUBLISHING

PROGRAMMED FOR SUCCESS

■ POWER PROGRAMMING

```
cmp     ax,2            ; anything entered?
je      main3           ; empty line, exit

                        ; call QFN routine to
                        ; validate and qualify
                        ; the filename...

sub     ax,2            ; AX = length (decrease
                        ; to remove CR-LF)
                        ; DS:SI = addr of filename
mov     si,offset DGROUP:inbuff
call    qfn             ; go qualify filename
jc      main2           ; jump if bad filename

push    si              ; save qualified filename
push    ax              ; address and length

                        ; first display title...
mov     dx,offset DGROUP:msg2
mov     cx,msg2_len     ; message length
mov     bx,stdout       ; standard output handle
mov     ah,40h          ; function 40h = write
int     21h             ; transfer to MS-DOS

pop     cx              ; get filename length
pop     dx              ; get filename address
mov     bx,stdout       ; standard output handle
mov     ah,40h          ; function 40h = write
int     21h             ; transfer to MS-DOS

        jmp     main1           ; get another filename

main2:                          ; display error message...
                                ; address of message
        mov     dx,offset DGROUP:msg3
        mov     cx,msg3_len     ; length of message
        mov     bx,stdout       ; standard output handle
        mov     ah,40h          ; function 40h = write
        int     21h             ; transfer to MS-DOS
        jmp     main1           ; get another filename

main3:  mov     ax,4c00h        ; terminate with
        int     21h             ; return code = 0

main    endp

_TEXT   ends

STACK   segment para stack 'STACK'

        db      128 dup (?)

STACK   ends

        end     main
```

(Figure 2 ends)

```
C>TRYQFN  <Enter>
Enter filename:          foo.dat  <Enter>
The full pathname is:    c:\word\pc\foo.dat
Enter filename:          c:..\foo.dat  <Enter>
The full pathname is:    c:\word\foo.dat
Enter filename:          c:..\  <Enter>
The full pathname is:    c:\word\        .
Enter filename:  <Enter>
C>
```

Figure 3: *A sample session with the TRYQFN demo program.*

tine can be used to generate fully qualified names of files that are going to be created, or to evaluate drive/path combinations without any filename at all. If you supply QFN with only a drive identifier, it will return the drive and the current path for that drive. If you provide QFN with a partial or relative path terminated by a backslash, it will return a fully qualified drive and path combination.

HOW QFN WORKS The first thing QFN does, after saving the various registers and putting away the address and length of the supplied filename, is to use interrupt 21h functions 19h and 47h to obtain and save the current drive and directory. This is because we're still going to let MS-DOS do the hard work of inspecting the directory structure and evaluating such horrid possibilities as

```
z:dir1\..\dir2\..\myfile.dat
```

Thus, QFN starts by picking off the drive code (if any is supplied) and calls interrupt 21h function 0Eh to select that drive as the current drive. Unfortunately, function 0Eh is the direct equivalent of one of the more brain-damaged CP/M functions: it does not return an error code. The only way to tell whether function 0Eh succeeded is to follow it with a call to function 19h and see whether the drive we asked for actually became the current drive.

Next, QFN extracts the path component by scanning for the last backslash character, copies the path into a local buffer, adds a terminating null byte, and calls interrupt 21h function 3Bh to make it the current directory. We allow MS-DOS the fun of figuring out relative paths (which do not begin with a backslash) and the meaning of any dot (.) or double-dot (..) aliases that the path contains. If the call fails, we know that the path is invalid—some directory named in the path does not exist.

Once we get this far, the rest is simple. We call interrupt 21h functions 19h and 47h to get the current drive and directory, format them together in an ASCII buffer, and append the original filename. We fold the drive code, path, and filename to lowercase characters for visual consistency. Last, we restore the original path and drive and return the address and length of the fully qualified filename to the calling program.

By asking MS-DOS to figure out any complexities in the original path, and then retrieving the cleaned-up path, we've avoided a lengthy and messy coding problem. Of course, there may be MASM connoisseurs out there who will say the code for the QFN routine is lengthy and messy enough as it is. At first glance, there are certainly portions of it that appear redundant or unnecessary. There are three reasons for this:

1. I wanted to supply a routine that would also handle drives and/or partial paths without a filename.

2. I am a strong believer in having a common cleanup and exit point, for the sake of code integrity. Thus, I'm always willing to insert a little extra code elsewhere in order to simplify code at the exit point.

3. A backslash in an MS-DOS path has two totally different meanings, depending on its position. If the backslash occurs at the start of the path, it is the "name" of the

PC MAGAZINE REPORTS..."PC Labs tested drive

AND NORTHGATE'S 80286

TAKE THE NORTHGATE THRUPUT TEST!

Find out if your "zippy-fast" hard drive system is REALLY in the fast lane. Send us $5.00 cash, check or money order and we'll send you the THRUPUT test program. In seconds you'll know how your system compares to Northgate systems. And when you buy a Northgate system, we'll refund the $5.00!

NO PHONE REQUESTS PLEASE

Now, with Northgate Super 286

Turbo Throughput™

'87 Best Buy OF THE YEAR

800,000 Bytes Per Second Data
• Turbo Speed Hard Drive Controllers

TRULY A COMPLETE, READY TO USE SYSTEM YOU GET ALL THESE QUALITY FEATURES:

65MB Miniscribe Hard Drive, Formatted and Partitioned 32.5MB in C and D Partitions • Turbo Throughput 16-Bit Hard Drive RLL and 1:1 Interleave Controller • 12MHz Intel Processor • 6 16-Bit, 2 8-Bit Expansion Slots • 1.2MB (Reads & Writes 360K Disks) AND 1.44MB Drive (Reads & Writes 720K) • 200 Watt Power Supply • 2 Parallel, 1 Serial Port • Full Size (Not Baby Size) Case with Keylock, Turbo On/Off, Indicator Lights • 14 Inch Tilt/Swivel Flat Screen Amber Graphics Monitor with 1000 Line Resolution Capability for CAD • Hercules Compatible Graphics Card • Latest Version MS-DOS 3.3 with GWBasic including hardbound manuals for both (Northgate is a Microsoft OEM Licensee).

AND NOW, TO GIVE YOU EVEN GREATER PERFORMANCE...

DRIVE CACHING AND VOPT™ OPTIMIZER ARE INCLUDED!

installed on your hard drive is Northgate's exclusive Insta-Cache™ Hard Disk Caching program. Once a file is read it's in cache. Retrieving it again is 0-wait. No hard drive access is needed. This is an $80.00 value, yours at no extra cost. AND...WE ALSO GIVE YOU THE BEST DISK OPTIMIZER PROGRAM EVER—VOPT™ BY GOLDEN BOW SYSTEMS. CLEANS UP FRAGMENTED SECTORS AUTOMATICALLY EVERY TIME YOU START YOUR SYSTEM. A $50.00 VALUE, AGAIN YOURS FREE WITH THE NORTHGATE 286.

SYSTEM OPTIONS—PHONE FOR CURRENT PRICING. EGA, EGA+, MFM HARD DRIVES, ESDI & SCSI TO 300MB STREAMING TAPE BACKUP. HARD DRIVE BACKUP FROM $389. MEMORY EXPANSION CARDS, CO-PROCESSORS.

400% Faster Performing
WORLD CLASS QUALITY
Features Unmatched Anywhere

The Bottom Line

$2199.00 complete as shown

throughput on all the (21) machines in this review, (Feb. 16, 1988)
WAS THE FASTEST...

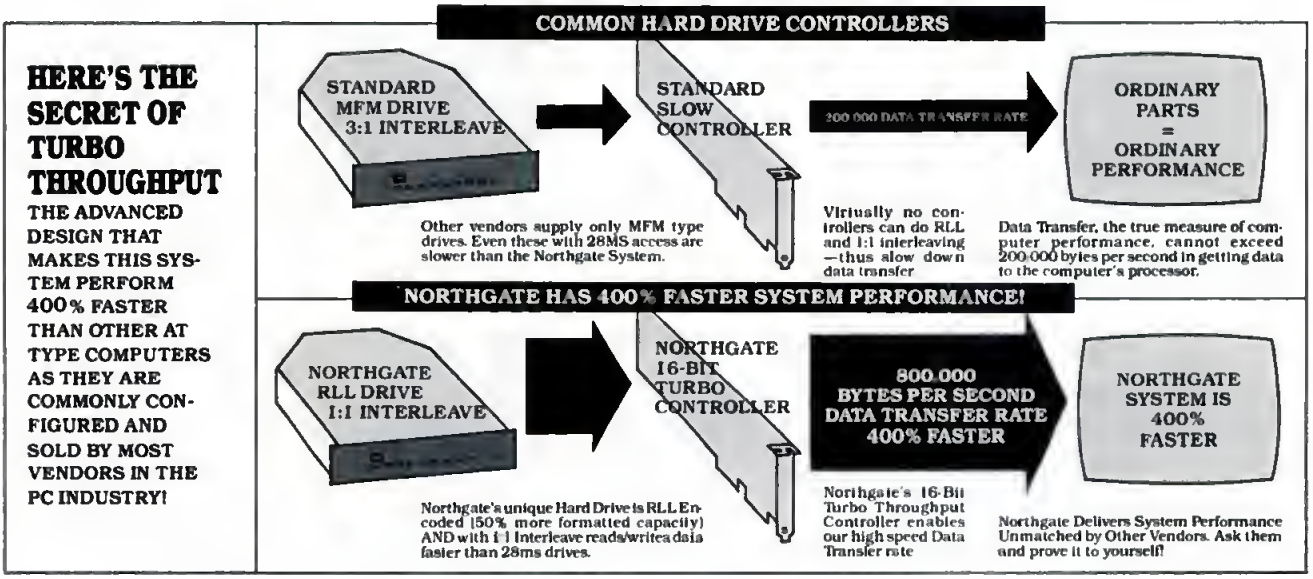
65MB Hard Drive System you get:

Computing Power

Transfer Rate • RLL Encoded Hard Drives • 1:1 Interleaving • World's Highest Performance AT Class Computer System!

HERE'S THE SECRET OF TURBO THROUGHPUT

THE ADVANCED DESIGN THAT MAKES THIS SYSTEM PERFORM 400% FASTER THAN OTHER AT TYPE COMPUTERS AS THEY ARE COMMONLY CONFIGURED AND SOLD BY MOST VENDORS IN THE PC INDUSTRY!



Most computers look similar. Most vendors advertise processor speed and 28MS hard drive access. There is little to distinguish one from another. Thus everyone tends to assume all computers are alike.

NOT SO. Northgate is truly a different System. And because it is, the computer buyer gets far greater computer value for his money. That's why Northgate has soared in popularity. Those who know choose Northgate. They know they get value through performance that's demonstrated every time they turn on the system. They know all parts are World Class, not the ordinary "off the shelf" items others use to keep costs down.

Northgate pioneered RLL Hard Drive and 1:1 Interleaving in its 286 systems. To our knowledge, no competitor even offers these vital performance features. Call them. We did. Only Northgate gives you this unique throughput-enhancement.

If Northgate pricing seems higher, don't be deceived by Bare Bones Prices you see in others' ads. Northgate's System is complete—IT'S THE 286 SYSTEM YOU WON'T OUTGROW! We encourage you—Shop Around, Call all the Others and Compare.

ALL THIS PLUS...The Computer Industry's Most Meaningful Service and Warranty Policy...

30-Day Compatibility Warranty:
Northgate guarantees its systems will operate any standard, commercially available DOS programs written for use on IBM Compatible Computers. If, on consultation with Northgate a program cannot be made to operate satisfactorily, owner may return the system, complete and unaltered for a prompt and full refund including all freight costs.

One-Year Overnight AT NORTHGATE EXPENSE Parts Replacement Warranty:
Northgate Computer Systems warrants that all systems sold by Northgate will be free of defects in workmanship and materials for one year from date of shipment.

- In the event of failure of a part that disables the system Northgate will ship, the same day if notified by 12 Noon Central Time, a new replacement part. Customer must phone Northgate Customer Service for diagnosis of the failure
- Shipment of the replacement part will be by overnight-express service—AT NORTHGATE'S EXPENSE—for next day delivery depending on the carrier's ability to provide such service in owner's geographic area
- Owner must return any replaced part, complete and unaltered, and pay return shipping costs, to be received at Northgate within two weeks after receiving the replacement part.
- Northgate's Customer Service department will provide full instructions on making the repair or replacement and will consult with customer on the phone to assure repair is properly completed and the system is again operating
- In the case of a complete system returned for repair under warranty, customer pays freight to Northgate and Northgate pays return freight by whatever service the system is sent to Northgate

In the event of a part replaced under warranty, the new part carries a NEW ONE-YEAR GUARANTEE FROM SHIP DATE!

NOTE: Many computer vendors extend only the parts manufacturer's warranty which may be as little as 30-days. All products sold by NORTHGATE are fully guaranteed by Northgate for one year from date of shipment.

NORTHGATE COMPUTER SYSTEMS
A DIVISION OF A.B.L. INCORPORATED

13895 INDUSTRIAL PARK BLVD., SUITE 110
PLYMOUTH, MINNESOTA 55441

HOURS: Mon.-Fri. 8 A.M.-7 P.M. CST, Sat. 9 A.M.-3 P.M.

USE OUR TOLL FREE ORDER LINE

800-548-1993

VISA MC COD TERMS: Credit Card, Pre-Payment (allow 2 weeks for personal checks to clear) Wire Transfer and Purchase Orders for Rated Accounts. We also ship to APO and FPO. All shipments are FOB Minneapolis, MN

ALL CORPORATION AND BRAND NAMES IN THIS AD ARE THE PROPERTY OF THEIR RESPECTIVE OWNERS. NORTHGATE IS NOT RESPONSIBLE FOR ERRORS OR OMMISSIONS IN THIS ADVERTISEMENT. • PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE. • TURBO THROUGHPUT, INSTA-CACHE AND NORTHGATE ARE TRADENAMES OF NORTHGATE COMPUTER SYSTEMS. COPYRIGHT 1988, NORTHGATE

EXCERPT FROM PC WEEK REVIEW MARCH 8, 1988 USED WITH PERMISSION

Database Add-In for 1-2-3 Has More Capabilities Than Rivals

by Marvin Bryan

The king of the crowded forest of Lotus 1-2-3 database add-ins is unquestionably @BASE...

@BASE was developed by Personics Corp. of Concord, Mass., makers of the popular SeeMORE utilities that add additional columns to the screen displays of Lotus 1-2-3 and Symphony.

With @BASE, it's possible to build colossal 32 M-byte databases in the standard dBASE III Plus format without ever using dBASE itself. Users can convert a normal 1-2-3 database instantly into a dBASE-compatible file, as well as set up dynamic links that will import updated information from dBASE records every time a worksheet is recalculated.

A database can be sorted alphabetically, numerically or chronologically on as many as 128 levels. In fact, @BASE will pack and sort records as much as three times faster than dBASE...

Data can be analyzed with a cross-tabulation module to provide lightning-fast reports in response to such questions as "What sales people in each division earned more than $20,000 in commissions this month?"

In addition, records can be entered or examined in a form view, where each record occupies an individual screen. Alternatively, of course, the user can choose the usual one-record-to-a-line format.

We tested the current $195 release of @BASE along with a beta copy of the Option Pac, which will retail for $89.95. **Together, these two relatively inexpensive products provide truly remarkable functionality.**

In addition to the indexing feature, the Option Pac will join files to make relational databases, create computed or derived fields, sort a database without rearranging the records on disk, and automatically keep files in the correct sorting order during record entry or updating.

See our ad on page 17.

As a bonus, dBASE data can be turned into 1-2-3 graphs with practically no effort at all...

Personics has developed a series of @DB functions to perform calculations and evaluate records within @BASE... Each of these functions use one or more arguments to identify the database, record or field to be acted upon. Some functions allow criteria to be established, such as selecting a subset of records

The 200-page manual for @BASE is excellent...The program adds less than 80K bytes to the RAM overhead of 1-2-3. **For those who use both dBASE and Lotus 1-2-3, @BASE is practically a requirement.** ■

@BASE

A database add-in for Lotus 1-2-3 that will access and create dBASE files without the use of dBASE itself. **A superior product in every respect.**

Price: $195
From: Personics Corp.
2352 Main St., Building 2
Concord, MA 01742

(617) 897-1575
(800) 445-3311 X1103

Discover SimpLAN™

The Intelligent Printer Sharing Network

$259

- o Low cost network for sharing printers and plotters
- o Easy to install, simple to use
- o User transparent operation
- o All applications run without modification
- o Automatic document separation and paper management
- o Large number of users can be accomodated

For additional information, contact your dealer or call toll free:
800-445-6190 , *or* 408-746-2965 *(Inside California)*

ASP COMPUTER PRODUCTS, INC.

1026 W. Maude Ave., Suite 305
Sunnyvale, California 94086
Fax: 408-746-2803

root directory and is followed immediately by the name of another directory with no intervening delimiter. If it occurs in any other position, it is simply a delimiter that separates two other directory names and has no intrinsic significance at all.

TRYING THE QFN ROUTINE The program TRYQFN.ASM in Figure 2 demonstrates the use of the QFN routine. It prompts the user for a filename, qualifies it with the drive and full path, and displays

■ The program TRYQFN .ASM demonstrates the use of the QFN routine. It prompts the user for a filename, qualifies it with the drive and full path, and displays the result.

the result. The demo program may be terminated at any time by pressing the Enter key alone in response to a prompt or by hitting Ctrl-C (^C).

To assemble the files TRYQFN.ASM and QFN.ASM into object modules and then link the modules to create the executable program TRYQFN.EXE, enter the following commands:

```
MASM /Zi TRYQFN;
MASM /Zi QFN;
LINK /CO TRYQFN+QFN;
```

The /Zi and /CO switches can be omitted if you don't want to poke around in QFN's innards with *CodeView*. A sample session using the TRYQFN program is displayed in Figure 3.

THE IN-BOX Please send your comments and suggestions to me at any of the following e-mail addresses:

BIX: rduncan
PC MagNet: 72241,52
MCI Mail: lmi PC

Enjoy a big Mac without eating anything.

What's this stack of DOS software doing next to a Macintosh® II? Waiting to be thrown out, right?

Wrong.

And while we're on the subject, what on earth is Lotus® 1-2-3® doing on these Mac screens?

Would you believe it's running?

That's right, 1-2-3 now runs—very smoothly and very quickly—on the Mac II and SE.

So does SideKick® dBASE III PLUS.® The Norton Utilities.™ Microsoft® Flight Simulator. And all the DOSware we're aware of.

Including the programs—and data files—you assumed you'd have to eat in order to enjoy the fruits of Macintosh.

SoftPC even runs on your accelerated Mac SE.

Teach your old DOS new tricks.

With SoftPC® software, running your favorite DOSware on your Mac is as easy as opening a window. And just as transparent.

You can open several DOS windows at once. Or both DOS and Mac windows. Then you can jump back and forth between them. Even cut and paste.

Remember, you're on a Mac now, so you can do new things with your old DOSware.

But if you feel nostalgic, you can always put your new Mac on a LAN with your old PCs.

(Shhhh. With SoftPC, your LAN can't tell the difference.)

Food for thought.

SoftPC is either the best thing to happen to DOS or the best thing to happen to Macintosh.

For sure, it's the best way we can think of to spend $595.

You'll only have to spend it once. Because SoftPC is designed to take advantage of the latest technology.

Even technology that isn't here yet.

Fortunately, SoftPC is here now. Your dealer will be delighted to give you a demonstration.

Just ask for a big Mac with plenty of DOS.

Insignia™

Insignia Solutions Inc. Cupertino, CA 95015-0399
Tel: (408) 446-4992.
FAX: (408) 446-2236

SoftPC is a registered trademark of Insignia Solutions Inc. Distributed by Softsel.®

CIRCLE 496 ON READER SERVICE CARD

BUYING THE RIGHT PRODUCT AT

NEC JC-1402
Multisync II
$589

MONITORS

Amdek
Video 210A 12" Amber 89.00
Video 410 12" A/G/W (ea.) 135.00
Video 432 PS/2 A/W VGA 169.00
Color 722 Dual Mode RGB ...449.00
Color 732 12" PS/2 VGA 499.00
Magnavox
7BM623 12" TTL Amber 85.99
CM8762 14" Comp/RGB 279.00
9CM053 14" HI-Res EGA 379.00
8CM873 14" Multimode EGA .449.00
9CM082 14" VGA Color.....Call
7BM749 14" Flat VGA White ...Call
NEC
1501 Multisync-Plus 999.00
2001 Multisync-XL 20" VGA .2099.00
Peckerd Bell
PB-1418F 14" Flat TTL A/G/W 129.00
PB-1422EG 14" HI-Res EGA ..359.00
Polariod
Palette EGA Plus 2499.00
Princeton Graphics
Max-12 12" TTL Amber 149.00
HX-12E 12" EGA 479.00
Ultrasync 12" VGA 579.00
Seiko
CM 1430 14" VGA.....689.00
Thomson
4120 14" RGB/Composite....229.00
Zenith
ZMM-149 4" PS/2 Amber 209.00
ZCM-1490 14" VGA Ang.....699.00

MULTIFUNCTION CARDS

AST
Six Pak Plus 576 .....149.00
Advantage/2 PS/2 Board 309.00
Hot Shot 286 Board 399.00
Boca Research
Top Hat 128K Expansion 99.00
Boca Multi-EGA.....169.00
Bocaram/AT O-4MB Card 149.00
DCA
Irma 2.2 3278 I/O 749.00
Evarex
EV-159 Ram 3000.....99.99
EV-657 Micro Enhancer II 149.00
EV-673 Everex Evga Adapter .279.00
5th Generation
Logical Connection 512K 389.00
Hercules
In-Color Card 189.00
Graphics Card 149.00
Graphics Card Plus 169.00
iDEAssocietas
iDE-5251 Emulation Board ...579.00
Intel
Inboard 386/AT & 386/PC .....Call
4020 286 Board w/512k 369.00
8087 Co-Processor 119.00
80387-16 Co-Processor 529.00
NSI
Smart EGA Plus.....219.00
Quadram
Quad 386-XT PC Upgrade 799.00
Model-30 Quadboard PS/2 ...319.00
The Complete PC
Complete Answ. Machine ...299.00
Complete Hand Scanner 219.00
Tseng Labs
EVA 480 EGA Adapter.....219.00
Video-7
VEGA EGA Deluxe Adapter ..229.00
VEGA VGA Video Adapter ...299.00
Zuckerboard
Monochrome Graphics Card ..79.99
AT-Primary Memory Board 99.99

HERCULES
Color Card
$119

STORAGE DEVICES

ATD
Tandy 20MB Hard Card 499.00
Everex
Stream 60-8 Ext. Tape-Backup 739.00
Stream 60 PS/2 Tape-Backup 1299.00
Iomega
5¼" Bernoulli Box II 999.00
Irwin
110D 10MB XT Tape-Backup .219.00
Miniscribe
8425 20MB 3½" 40msec. 349.00
3053 44MB 5¼" 25msec. 669.00
6085 70MB 5¼" 28msec. 889.00
Mountain
20 MB Drivecard 449.00
30 MB Drivecard 529.00
50MB Drivecard 699.00
TD-4440 40MB Ext. PS/2 AT ..599.00
60MB Mountain Tape 999.00
Dual 5.25" Beta Bernoulli ...1899.00
PC-TOO
TD4000 40MB Tape-Backup ..349.00
Plus Development
20MB Hard Card 599.00
40MB Hard Card 779.00
Racore
Jr. Expansion Chassis 299.00
Seagate
ST-225 20MB 1/2 Height 249.00
ST-238 30MB 1/2 Height 289.00
ST-251 40MB 1/2 Height 449.00
Sony
3½" 720K Floppy Drive 109.00
Sysgen
Bridge-File PS/2 Drive 249.00
Bridge-Tape 40MB Backup ...499.00
Durapak Single 15MB 999.00
Smart Image 60MB Tape 479.00
QIC - File 60MB Tape 599.00

WE SHIP 90%
OF ALL ORDERS
WITHIN 24 HOURS

SELECT FROM
OVER 3000
PRODUCTS

COMPUTER MAIL ORDER

THE RIGHT PRICE . . . EVERYTIME!

COMPUTERS

AST
Premium 286 Model-140 . . . . . Call
Compaq
386 Deskpro's & Portables . . . . . Call
IBM
PS/2 Model 30, 50, 60, 80 . . . . . Call
NEC
Powermate ii 40MB 2299.00
Multispeed EL-2 . . . . . 1499.00
PC-TOO
512K 8 MHz 1.2MB 80286 . . . . 899.00
Toshiba
1000, 1100+, 1200, 3120 Laps . . Call
WYSE
Model 50, 60 Terminals . . . . . Call

TOSHIBA
T-1000
Laptop $749

MODEMS

Anchor
1200E Externai 129.00
ATD-Zuckerboard
1200 Baud Nude 1/2-Card 79.99
Beat Producta
Smart 2400 1/2-Card w/Soft . . 149.00
Everax
Evercom 920 1200 Baud int. . . 89.99
Evercom 940 2400 Baud Ext. . 199.00
Hayes
Smartmodem 1200 Ext. 289.00
Smartmodem 2400 Ext. 439.00
Practicai Peripherals
Complete Telecom Pak 69.99
2400 Stand Aione 189.00
U.S. Robotics
2400 Baud Direct int. 179.00
2400 Baud Direct Ext. 189.00

EPSON
LQ-1050 24 Wire
330 CPS $699

PRINTERS

Brother
M-1509 180cps, 132 coi. 389.00
HR-40 40cps, Daisywheel 669.00
FAX-100 Fascimile Machine . 979.00
Canon
PC-25 Personal Copier 899.00
Citizen
Premier-35 35cps, Daisywhi. . 479.00
Epson
LX-800 150cps, 80 col. 179.00
FX86E, 240cps, 80 coi. . . . . Call
FX-286E, 240cps, 132 coi. . . . . Call
LQ-500 180cps, 24-Wire . . . . . Call
LQ-850 330cps, 80 coi. . . . . Call
LQ-2500 334cps, 24-Wire . . . . . Call
Hewlett-Packard
2225 Think Jet 369.00
NEC
P2200 Pinwriter 24-Wire 379.00
P660 Pinwriter 24-Wire 469.00
P760 Pinwriter 132 coi. 639.00
LC-890 Postscript Laser 3399.00
Okidata
ML-320 80 col. 300cps 379.00
ML-292 80 col. 240cps 389.00
ML-390 24-Wire 270cps 519.00
ML-293 132 col. 240cps 529.00
ML-393 24-Wire 450cps 999.00
Panasonic
KX-P1080i 144cps, 80 coi. 179.00
KX-P1091i 194cps, 80 coi. 209.00
KX-P1595 240cps, 132 col. . . . 479.00
Sharp
FO-300 Facsimile Machine . 1349.00
Star Micronics
NX-1000 140cps, 80 col. 179.00
NX-15 120cps, 132 coi. 319.00
Toshiba
P321-SL 216cps, 24-Wire 499.00
P351-SX 300cps, 24-Wire 999.00

SOFTWARE

Aldua
Pagemaker Ver. 3.0 . . . . . 569.00
Ashton Tate
d-base III+ 389.00
Multimate Advantage ii 279.00
Boriand
Quattro 129.00
Central Point
Copy II PC 24.99
PC Option Board Deluxe 129.00
Computer Associates
Accpac Easy Accounting 79.99

5th GENERATION Fastback Plus $84.99

Fox Software
Fox Base + Development . . . 219.00
IMSI
Page Perfect Desktop 339.00
Optimouse w/Dr. Halo 79.99
Logitech
Hi-Res Buss Mouse 99.99
Lotua Development
Lotus 1-2-3 . . . . . 299.00
Meca
Managing Your Money 119.00
Microrim
R:Base For DOS 499.00
Microsoft
Microsoft Mouse Bus/Ser . . . 109.00
Norton Software
Utilities 4.0 . . . . . 54.99
Software Publishing Group
PFS: First Choice 89.99
Word Perfect Corp.
Word Perfect 5.0 . . . . . NEW
Xerox
Ventura Publisher 1.1 . . . . . 519.00

In the U.S.A. and in Canada

Call toll-free: 1-800-233-8950.

Outside the U.S.A. call 717-327-9575 Fax 717-327-1217

Educational, Governmental and Corporate Organizations call toll-free 1-800-221-4283

CMO, 101 Reighard Ave., Dept. B1, Williamsport, PA 17701

OVER 350,000 SATISFIED CUSTOMERS • ALL MAJOR CREDIT CARDS ACCEPTED • CREDIT CARDS ARE NOT CHARGED UNTIL WE SHIP

POLICY: Add 3% (minimum $7.00) shipping and handling. Larger shipments may require additional charges. Personal and company checks require 3 weeks to clear. For fastar delivary, use your credit card or send cashiar's check or bank monay order. Credit cards ara not chargad until wa ship. Pannsylvania residents add 6% sales tax. All prices ere U.S.A. prices end ara subject to change end ell items ere subject to eveilebility. Detective sottware will ba repieced with the same item only. Hardwara will be raplaced or repaired et our discretion within the terme end limits of the menufecturer's warrenty. We cannot guerentee competibility. All sales are final and returned shipments are eubject to e restocking fee. We are not reaponaible for typographic or photographic errors.

B107

CIRCLE 183 ON READER SERVICE CARD

A lot of computer for your money

INCREDIBLE SYSTEMS PRICE REDUCTION!

Bentley-286/12

Base System $1095

12MHz 80286 processor, 1MB RAM, 1.2MB floppy drive, dual floppy/hard drive controller, 200-watt power supply, and keyboard.

- **With 40MB HD Seagate, 30ms $1545**
- **With 70MB HD MiniScribe, 28ms $1815**

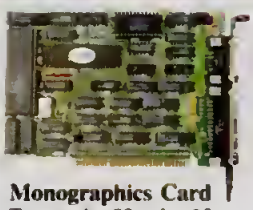
Bentley-286/10

Base System $979

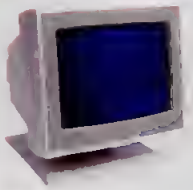
10MHz 80286 processor, 512KB RAM, 1.2MB floppy drive, dual floppy/hard drive controller, 200-watt power supply, and keyboard.

- **With 40MB HD Seagate, 30ms $1429**
- **With 70MB HD MiniScribe, 28ms $1699**

Bentley Computers ... The Price/Performance Leaders!



Monographics Card
Text mode: 80 col x 25 lines; graphics mode: 720 x 348; parallel port **$65**



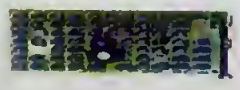
Samsung
12" flat screen with tilt and swivel base **$95**

Mono Combo
Monographics card and monitor **$139**

EGA Card
640 x 350, 256KB display RAM **$129**

EGA Monitor
14" tube, 13" diagonal high-resolution **$349**

EGA Combo
EGA card and monitor **$469**



Color Card
640 × 200 color graphics card **$59**

Color Monitor
14" tube, CGA monitor **$239**

Color Combo
CGA card and monitor **$289**

Mice-Indispensible for desktop publishing applications, mice provide easy cursor movement for a variety of software packages.

Logitech Bus Mouse $89
Logitech C7 Serial Mouse $79
MS Bus Mouse $119
Genius GM-6+ Serial Mouse $55

Modems-All Bentley modems are compatible with all popular communication standards and have auto answer, auto redial, and auto voice/data switching. External modems include LED status indicators and require modem cable for hookup.

300/1200 Baud Internal Modem $69
300/1200/2400 Baud Internal Modem $139
300/1200 Baud External Modem $89
2400 Baud External Modem $159

More memory, more power...

XT-MFC-A six-function expansion card: 384KB RAM, serial port, parallel port, game port, clock-calendar with battery backup, and utility software.
Only **$199**

AT-MFC-for IBM PC AT® Up to 1.5MB memory expansion, serial & parallel port. Comes with 0KB.
Only **$110**

MEM-576-Memory expansion card that fits in a short slot and supports either 64KB or 256KB chips. Comes with 0KB, expandable to 192KB, 284KB or 576KB.
Only **$35**

EMS-Expanded-Memory-Specification card compatible with the Lotus/Intel/Microsoft memory specification. Comes with 0KB, expandable to 2MB. Includes utility software.
PC Version
Only **$99**
AT Version
Only **$119**

Orchid Tiny Turbo-80286 processing speed for your PC.
Only **$299**

Coprocessors

8087-3 (5MHz)	$129
8087-2 (8MHz)	$159
80287-6 (6MHz)	$219
80287-8 (8MHz)	$269
80287-10 (10MHz)	$349

AT I/O-Serial port and parallel port
Only **$59**

PC I/O-Serial port, parallel port, game port, and clock-calendar with battery backup.
Only **$65**

... plus a one-year warranty!

INCREDIBLE SYSTEMS PRICE REDUCTION!

Bentley-286/8

Base System **$845**

8MHz 80286 processor, 512KB RAM, 1.2MB floppy drive, dual floppy/hard drive controller, 200-watt power supply, and keyboard.

- **With 20MB HD Seagate, 65ms** **$1095**
- **With 40MB HD Seagate, 30ms** **$1295**

Bentley Turbo-10

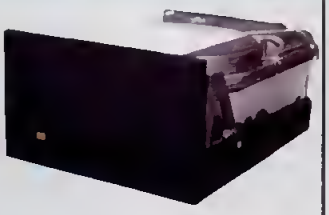
Base System **$499**

Turbo-charged XT-compatible 8088 processor running at 10MHz, 640KB RAM, one 360KB floppy drive and controller, eight expansion slots, 150-watt power supply, and keyboard.

- **With 30MB HD MiniScribe, 65ms** **$799**
- **With 40MB HD MiniScribe, 61ms** **$859**

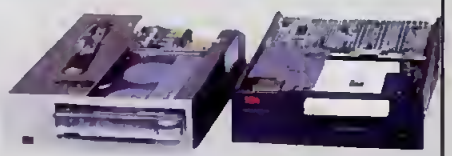
Enhance your Bentley-286 with our popular AT add-on products!

Hard Disk Drives



High Quality • High Storage Capacity
Low Price • High Performance
One-Year Limited Warranty
For Your Bentley-286

40MB Seagate (30ms) **$459**
43MB MiniScribe (25ms) **$569**
70MBMiniScribe (28ms) **$749**



Internal Tape Backups-Avoid disk swapping; use streaming tape for your IBM PC®, AT®, or compatibles.

40MB For the PC ... **$389** **60MB** For the AT **$757**

PC Hard Disk Kits-
Quality 30MB and 40MB hard disk kits for the IBM PC and compatibles. Each kit includes a half-height Winchester hard disk, hard disk controller, cables, software, mounting hardware, and complete illustrated installation manual.

20MB MiniScribe (65ms) **$279**
30MB MiniScribe (65ms) **$339**
40MB MiniScribe (61ms) **$399**
20MB For the Compaq Portable **$299**

360KB Diskette Drives-
Convenience and compatibility.

For PCs **$99**
For ATs **$109**

Bentley

Computer Products

1700 Still Meadow Cove Round Rock, Tx. 78681

Amazing prices on quality computers and add-on products. Free UPS ground shipping in the continental U.S.A. Thirty-day, money-back guarantee (does not include return freight). No surcharge for MasterCard, VISA, COD, or cashier's check. Fortune 1000, university, and institution purchase orders accepted with approved credit. Prices are subject to change without notice. One-year limited warranty.

Sales Hours: Mon.— Fri. 8 a.m.— 9 p.m.
Sat. 9 a.m.— 5 p.m.
Tech. Support: Mon.— Fri. 9 a.m.— 5 p.m.

Order Toll Free
800-234-4442
Tech Support: 512-250-8202

CIRCLE 275 ON READER SERVICE CARD

Advanced Revelation:™ Building PC Applications dBase III And The Others Simply Cannot Handle.

Discover The Advanced Revelation™ Difference

Building a comprehensive personnel/payroll system to manage 15,000 employees on a 24-user 386 PC network is not the kind of application you would want to tackle with an ordinary DBMS product best suited for building phone lists.

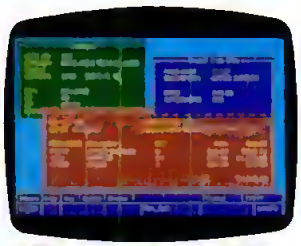
Nor would you want to rely on a traditional DBMS, to take on the challenge of building a materials handling and order shipping control system to be accessed in 120 manufacturing locations worldwide.

That's because it takes more than just a DBMS to build a solid PC application.

It takes a complete application building environment that includes not only a superior database, but also professional programmers tools and an easy-to-use Application Processor™.

And that's the Advanced Revelation difference.

Since 1982 Advanced Revelation has been the only complete application development environment for IBM PCs and compatibles that offers these three critical application building blocks:



Multiple windowing environment makes it easy to control data and establish relationships between files.

1 Advanced Revelation's Application Processor puts the end user in control

Most applications must be ultimately maintained by the users, able to write reports without any programming expertise. Customize their application by adding new fields of information, define new edit patterns, add entirely new windows.

Advanced Revelation's Application Processor offers a complete set of menu and window-driven tools for producing any application without coding or programming.

Pop-up windows offer options and HELP throughout the entire process.

Whenever a user builds screens, menus or windows, Advanced Revelation automatically builds and updates the central data dictionary and produces documentation.

2 Advanced Revelation's Programmer Tools for the professional application builder

Professional programmers require an advanced set of tools that permit efficient design of a complete application from database implementation to data entry and inquiry screens.

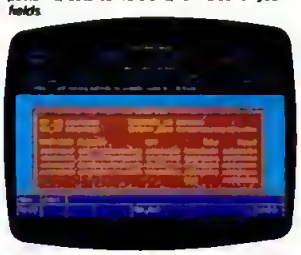
Advanced Revelation's Professional Programmer Tool Kit provides the tools you need to create even the most challenging applications. Like MRP and payroll/personnel systems. A task no traditional PC DBMS can perform.

Tools like a powerful programming language with complete dictionary integration, with dozens of database, string and three-dimensional dynamic array handling functions. A language so powerful that users have written such comprehensive utilities as word processors and spread sheets — applications normally written in the C language.

3 Advanced Revelation's Dictionary Driven Database centralizes intelligence

A solid PC application must be built around a superior database. One where all the information is centralized for ease of update and ease of maintenance.

Advanced Revelation's dictionary builder allows you to specify the names, output formats, edit patterns, data conversions, formulas for your fields.



Windows can be created and customized with Advanced Revelation's easy-to-use painter

Advanced Revelation's relational DBMS truly centralizes the intelligence of your application through an active data dictionary. One that manages every element of the application information including field lengths, edit patterns, field descriptions and formulas, assuring that application maintenance is easily performed.

Advanced Revelation's unique variable length record architecture (providing maximum record length of 65,500 characters; up to 32,000 fields per record) delivers efficiency in storage as well as substantial improvements in database flexibility.

With Advanced Revelation's exclusive linear hashing retrieval technique, your application building and database design capabilities are unsurpassed. Even if your application contains 100,000 records, and has 24 users on a LAN, your retrieval time still can be one-half second.

Experience the Advanced Revelation difference yourself. Send for your demonstration system today

In less than two hours, your fully functional Advanced Revelation demonstration system will guide you through development of a complete customer, invoice and product tracking system.

If you have never built an application before — fear not. And if you consider yourself a programming "connoisseur" — you are in for a development session you will never forget.

Simply call toll free

800-327-0216

In WA. 206-643-9898

RevelationTechnologies INC.

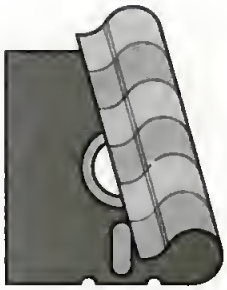
3633 136th Place, SE Bellevue, WA 98006
Two Park Ave., N.Y. NY 10016
Offices New York. Boston. Philadelphia. Atlanta. Chicago. Los Angeles. San Francisco.

NOTE Advanced Revelation is compatible with the IBM PC-AT IBM PS/2, Compaq and other 100 percent IBM Compatibles.
Advanced Revelation and Application Processor are trademarks of Cosmos, Inc., a subsidiary of Revelation Technologies, Inc. dBase III is a registered trademark.

CIRCLE 327 ON READER SERVICE CARD

■ DOUGLAS COBB AND STEVEN COBB

SPREADSHEET CLINIC



Editing records using an undocumented Query key function; calculating grand totals of worksheets with multiple sections; entering an actual monthly calendar series in 1-2-3.

A DATE SERIES MACRO

Because different months have different numbers of days, you can't use *1-2-3*'s /Data Fill command to create a series of dates exactly 1 month apart. Of course, you can enter a monthly date series manually. However, I prefer to use the macro shown in Figure 1.

The first statement in this macro allows you to specify the length of your series, which is stored in the cell MONTHS (B16). The macro then solicits the month, day, and year components of the first date in the series, storing your responses in the cells named MONTH (B14), DAY (B15), and YEAR (B16).

The next statement in the macro enters the serial value of the date described by the values in MONTH, DAY, and YEAR into the cell in which you have positioned the cell pointer. For example, if the cell pointer was on cell A21 when you invoked the macro, *1-2-3* would enter the function

```
@DATE(YEAR,MONTH,DAY)
```

into cell A21. If you specified 1 as the month component, 1 as the day component, and 88 as the year component, this function would return the value 32143—the serial date value of January 1, 1988.

After entering this date, *1-2-3* moves the cell pointer down one cell (to cell A22) and executes the statement in cell B7, which commands it to enter another @DATE function by typing and pointing. This function should return the serial date value of the day exactly 1 month later than the date whose serial value was returned by the function located in the previous cell. Each of the {Up} commands in this statement causes *1-2-3* to point to the previous cell—in this case, cell A21—as it builds the formula.

The +31 portion of the first argument of the @DATE function assures that when the previous date is in December of one year, the function will return a date in the next year. The +31 portion of the second argument of the @DATE function assures that the function will return a value for a date in the next month. The third argument, $DAY, assures that the function will return the value of the same day in each month.

To continue the example, *1-2-3* would enter the function

```
@DATE(@YEAR(A21+31),@MONTH(A21+31),DAY)
```

into cell A22. Since the function in cell A21 returned the value 32143—the serial date value for January 1, 1988—this function would return the value 32174—the serial date value for February 1, 1988.

The next statement in the macro copies

```
        A                       B
1   \d                  {GetNumber "Enter number of months: ",MONTHS}
2                       {GetNumber "Enter intial month (1-12): ",MONTH}
3                       {GetNumber "Enter day of month (1-31): ",DAY}
4                       {GetNumber "Enter intiel year (87=1987, etc.): ",YEAR}
5                       '@DATE(YEAR,MONTH,DAY)
6                       {Down}
7                       @DATE(@YEAR({Up}+31),@MONTH({Up}+31),$DAY)~
8                       /c~{Down}.{Down MONTHS-3}~
9                       {Up}
10                      /rfd4{End}{Down}~
11                      /rv{End}{Down}~
12
13  MONTHS
14  MONTH
15  DAY
16  YEAR
```

Figure 1: *This macro enters a series of month-spaced dates into a worksheet column.*

```
(a)     '@IF(@DAY({Up})>3,{Up}+28-@DAY({Up}+28),{Up}+31-@DAY({Up}+31))


(b)     '+@IF(@MONTH({Up})=1,@MIN(@IF(@MOD(@YEAR({Up}),4)=0,29,28),
        @DAY({Up}{Abs})),@IF(@MONTH({Up})=3#OR#@MONTH({Up})=5
        #OR#@MONTH({Up})=8#OR#@MONTH({Up})=10,
        @MIN(30,@DAY({Up}{Abs})),@DAY({Up}{Abs})))~
```

Figure 2: *Two modifications needed by the macro shown in Figure 1 to make it work in all cases. The label shown above as "(a)" replaces that in the original B7. The label shown as "(b)" above goes into a new row inserted between the original rows 7 and 8.*

■ SPREADSHEET CLINIC

the function that *1-2-3* just entered into the remaining cells of the range you wanted to fill. Since the year and month arguments reference the previous cell, the result of each function will be a value in the month after the month represented by the result of the previous function. Since the day component is an absolute reference to the cell named DAY, however, each date value will represent the same day of its month.

The final statements in the macro assign the D4 format to the cells into which it just entered @DATE functions, then replace those functions with their current results.

Jack McKinley
Denver, Colorado

Mr. McKinley's macro works well in most situations. But it will not generate a correct series when you specify the value 31 as the day component of the starting date, nor when you specify a day component of 29 or 30 and the series spans the month of February.

To make this macro work correctly in all cases, you must insert a new row between rows 7 and 8, and replace the entry in cell B7 with the label identified as "(a)" in Figure 2. You must then enter the label identified as "(b)" into cell B8. Together, these labels construct a formula that adjusts properly for the different number of days in each month.

QUERY FIND TRICK

When you issue the /Data Query Find command, *1-2-3* highlights the criterion-matching records, beginning with the matching record closest to the top of the database. (The Cursor Up and Down keys move the highlight to other criterion-matching records.) When you press Enter or Esc, *1-2-3* returns the cell pointer to the cell on which it was positioned when you issued the command.

In many cases, however, I want the cell pointer to stay on one of the highlighted cells when I cancel the /Data Query Find command. It's a nuisance to have to write down the address of the cell and return to it with the {Goto} command—and I've found an easier way.

If you press the Query key (F7) while *1-2-3* is in the FIND mode, *1-2-3* cancels the /Data Query Find command and returns you to the READY mode. Instead of returning the cell pointer to its original cell, the program leaves the cell pointer in the record that was highlighted when you pressed F7. Specifically, it puts the cell pointer on the cell that contains the underline cursor. Unless you pressed the Right or Left Arrow keys while *1-2-3* was in the FIND mode, this will be the leftmost cell of the record.

Unfortunately, *Quattro* does not support this useful behavior of the Query key. Perhaps Borland's programmers weren't aware of this feature, or else thought it was a bug.

Israel Kehaty
Corvallis, Oregon

This previously undocumented function of the Query key was new to us and will benefit many 1-2-3 *users. The feature would be even more useful in* Symphony *than in* 1-2-3, *since* Symphony *does not allow you to edit records while it is in the FIND mode. However,* Symphony *does not have a Query key.*

Fortunately, you can use a macro like that in Figure 3 to duplicate this action of the Query key. You should invoke this macro after issuing the {Menu} Query Find command, using the Cursor Down and Up keys to highlight the record you want, and using the Right and Left Arrow keys to position the underline cursor on the appropriate field of that record.

The first statement in this macro takes the absolute address of the cell in which the underline cursor was positioned when you invoked the macro and enters it into the cell named POSITION (B5). The next statement cancels the {Menu} Query Find command, returning the cell pointer to the cell on which it was positioned before you issued the command. The final statement moves the cell pointer to the cell whose address is stored in POSITION—the cell on which the underline cursor was positioned when you invoked the macro. To understand how this final statement works, see the following submission by Donald Fields.

```
        A                       B
1   \q                      {Let POSITION,@CELLPOINTER("address")}
2                           {Esc}q
3                           {Goto}{POSITION}~
4
5    POSITION
```

Figure 3: *This* Symphony *macro cancels a {Menu} Query Find command and positions the cell pointer on a cell of the last record that was highlighted.*

SAVING A CELL LOCATION

The set of macros presented by John Gufstason (Spreadsheet Clinic, April 12, 1988) that save the current position of the cell pointer works well, but I wish to suggest using a slightly different technique. Rather than enter the address of the current cell into a cell of the "return" macro, I put it into a cell outside the macro and access it with a subroutine call, as shown below in Figure 4.

The statement in the "save" macro enters the absolute address of the current cell into the cell named LOCATION (B3). The first part of the statement in the "return" macro tells *1-2-3* to press the Goto key. While the prompt "Enter address to go to:" is visible at the top of the screen, *1-2-3* reads the second part of the statement, {LOCATION}. This subroutine call tries to execute the commands in the cell named LOCATION.

In this case, the LOCATION cell sim-

```
        A                       B
1    \s                     {Let LOCATION,@CELLPOINTER("address")}
2
3   LOCATION
4
5    \r                     {Goto}{LOCATION}~
```

Figure 4: *This macro uses a subroutine call to access the saved address.*

When You Want To Leave A Good Impression.

There's a bit of the "master" in all of us. It shows up whenever you're called upon to create a work of art. Whether the subject is a three-dimensional drawing, a spreadsheet or a flock of birds on a summer sky, the impression you want to leave is professional, accurate and exactly as you first imagined it.

Bright beautiful colors. Ultra-fine resolution. Compatibility with state-of-the-art software. You'll get all of this and more with AST-VGA and AST-VGA Plus; two new full-range graphics adapters from AST.

AST-VGA is designed to take advantage of IBM® PCs, XT™s and compatibles. In addition to register-level VGA graphics and OS/2™ compatibility, drivers for Microsoft® Windows™ and popular application programs such as Ventura Publisher,™ AutoCAD™ and GEM™ are included. AST-VGA provides 16 colors at 800 x 600 and 256 colors at 600 x 400. All at a price that's as attractive as the screen you'll see on your computer.

AST-VGA Plus is a high-performace 16-bit graphics adapter that takes advantage of the extra speed of IBM AT®s and compatibles, including compatibles running at 12.5 MHz. With 16 colors at 800 x 600 and 256 colors at 640 x 480, it's easy to see why AST-VGA Plus is a must for sophisticated CAD/CAM applications.

Of course, both boards offer downward compatibility through EGA, CGA, MDA and Hercules® to insure your prior software investments. And 132-column support provides ease-of-use for all of your spreadsheet artists.

Interested in making a good impression? Call AST at **(714) 863-0181** and ask for **Operator Number AA22**, or send in the coupon.

Yes, send me information.
☐ AST-VGA Plus ☐ AST-VGA
☐ Please have an AST representative call me.

Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Phone ( ) _____

Send to: AST Research, Inc., 2121 Alton Avenue
Irvine, California 92714-4992, Attn: M.C. PC 7/88

AST® RESEARCH INC.

Times Have Changed.

AST markets products worldwide—in Europe call: 44 1 568 4350; in the Far East call: 852 0499 9113; in Canada call: 416 826 7514. AST and AST logo registered trademarks AST Research, Inc. IBM and AT registered and OS/2 and XT trademarks International Business Machines, Corp. Microsoft registered and Windows trademark Microsoft Corp. Hercules registered trademark Hercules Computer Technology. AutoCAD trademark AutoDesk. Ventura Publisher trademark Xerox Corp. GEM trademark Digital Research, Inc. Copyright © 1988 AST Research, Inc. All rights reserved.

CIRCLE 166 ON READER SERVICE CARD

Avery desktop Laser Printer Labels, guaranteed to feed automatically from your paper tray without melting or peeling off inside your HP,™ Apple,™ or other popular laser printer.

Ask for Avery Laser Printer Labels (Product code #'s 5160 through 5165) wherever computer and office supplies are sold. Or call **1-800-535-3232** ext. 30 for a **free sample pack** or the dealer nearest you.

AVERY

CIRCLE 204 ON READER SERVICE CARD

■ SPREADSHEET CLINIC

ply contains the label form of the absolute address of the cell on which the cell pointer was positioned when you invoked the "save" macro. Thus, *1-2-3* types that address to the right of the prompt. Since the cell below LOCATION is blank, the program returns to cell B5 and executes the final part of the statement, ~, which presses Enter. This completes the Goto command, moving the cell pointer to the cell whose address is stored in LOCATION.

Donald Fields
Louisville, Kentucky

The only precaution you must observe in using these macros is to make sure that the cell below the one containing the subroutine is blank or contains the {Return} command.

CALCULATING GRAND TOTALS

Many of my *1-2-3* worksheets are divided into multiple sections, like the one shown in Figure 5. To calculate a "grand total" for these worksheets you can use the simple formula +B7+B13+B20, which adds the results of the @SUM functions in the cells B7, B13, and B20. If you have to add or delete sections of the worksheet, however, you will then have to edit the formula so that it includes the subtotals for the added sections and excludes the subtotals for the deleted sections.

Recently, I've found a better way to calculate a grand total for a worksheet of this sort. Instead of using an addition formula, I now use an @SUM function to calculate the total of the entries in each section plus their subtotals, then divide by 2. For example, to calculate the grand total for the worksheet shown in Figure 5, I'd use the formula @SUM(B1..B21)/2. Since the @SUM function includes both the individual values and the sum of those values, its result is exactly double the true grand total. Consequently, dividing by 2 returns the correct answer.

Unlike the simple addition formula, this one does not need to be edited when I add or delete sections from the worksheet.

	A	B
1	SECTION 1	
2	Entry 1a	977.45
3	Entry 1b	888.85
4	Entry 1c	580.96
5	Entry 1d	722.15
6		----------
7	Subtotal 1	3,169.41
8		
9	SECTION 2	
10	Entry 2a	458.85
11	Entry 2b	964.15
12		----------
13	Subtotal 2	1,423.00
14		
15	SECTION 3	
16	Entry 3a	242.51
17	Entry 3b	648.46
18	Entry 3c	269.73
19		----------
20	Subtotal 3	1,160.70
21		
22	GRAND TOTAL	5,753.12
23		

Figure 5: *You can use the formula @SUM(B1..B21)/2 to calculate the grand total for this worksheet.*

■ The @SUM function is a better way to calculate a grand total of a worksheet with multiple sections.

When I insert new sections, *1-2-3* expands the @SUM range to include them; when I delete sections, *1-2-3* contracts the @SUM range. The extra row at the top and at the bottom of the @SUM range assures that *1-2-3* will adjust the formula properly when I add a new section above the first section or below the last one, and when I delete the first or last sections.

Alan Tiet
Los Angeles, California

Mr. Tiet's technique can come in handy in a number of different situations. Note, however, that it will return an incorrect result if, when you make your worksheet changes, you include a section for which you do not calculate a subtotal.

CONTRIBUTE TO THE CLINIC

Share your latest spreadsheet discovery through *PC Magazine*'s Spreadsheet Clinic. We'll pay you $50 or more for anything we print, *plus an extra $25 if you submit your letter on a disk*, together with a printout. Mail your contributions to Spreadsheet Clinic, *PC Magazine*, One Park Avenue, New York, NY 10016. PC

GE RENTS BIG BLUE FOR A LITTLE GREEN.

APPLE® MACINTOSH™ AND COMPAQ, TOO.

Short-term projects can be long on problems if you don't have the computer equipment you need. That's why renting PC s and peripherals from GE for presentations, trade shows, training sessions or seasonal expansion makes so much sense. Our vast inventory of IBM, Compaq, Apple, quality compatibles and related equipment is ready for overnight shipment. So, anything you need can be there fast. From a sea of Blue to a bushel of Apples, one phone call is all it takes. Call 1-800-GE-RENTS.

ORDER NOW AND SAVE 15%!

Rent a PC or peripheral from GE Rental/Lease before October 31, 1988, and we'll take 15% off your first rental order. So, renting from GE becomes more than just a great decision. It's a great bargain, too. Call today—1-800-GE-RENTS, Dept. L.

Call 1-800-GE-RENTS, Dept. L. Or Mail This Coupon.

☐ Yes! I'm interested in learning more about your offer of 15% off my first PC or peripheral rental. I understand I am not obligated in any way.

☐ Please send your FREE catalog of GE Rental/Lease products and services.

Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Phone _____ Ext or Dept _____

GE Rental/Lease

Send to GE Rental/Lease PO Box 105625 Atlanta GA 30345

IBM is a registered trademark of the International Business Machines Corporation. Macintosh and Apple are registered trademarks of Apple Computer Inc. Compaq is a registered trademark of Compaq Computer Corp.

CIRCLE 740 ON READER SERVICE CARD

We've got a couple of hot dates for developers.

September 14th-16th
Ashton-Tate Developer Conference
Century Plaza Hotel, Los Angeles

Ashton-Tate® invites you to join us for our second national Developer Conference, A MEETING OF THE MINDS II, in Century City, Los Angeles.

It's a conference designed to help you discover the state of the art in application development. You'll get a head start with new products and programming techniques that will save you precious time and increase your productivity in developing applications.

Choose from a wide range of in-depth technical sessions and code clinics. Explore new ideas with Ashton-Tate product specialists, leading industry experts, and corporate and government developers. And check out the latest additions to the Ashton-Tate product line, including dBASE IV Developer's Edition,™ SQL Server, dBASE DIRECT/36,™ dBASE DIRECT/38,™ Framework,® dBASE Mac RunTime,™ Full Impact,™ and the rest of the Ashton-Tate product family.

Attendance will be limited, so register early. Call (800) 343-4546 for a detailed brochure and registration packet. In California, call (800) 843-3103.

ASHTON·TATE®

Trademarks/owner: dBASE IV Developer's Edition, dBASE DIRECT/36, dBASE DIRECT/38, Framework, dBASE Mac RunTime, Full Impact, Ashton Tate, Ashton Tate logo/Ashton Tate Corp © 1988 Ashton Tate Corporation All rights reserved

CIRCLE 210 ON READER SERVICE CARD

■ EDITED BY SALVATORE P. RICCIARDI

USER-TO-USER

Automating program development using batch files; using the DOS APPEND command with BASICA; setting a brighter graphics palette.

BRIGHTENING UP GRAPHICS

The default color palette used in medium-resolution color modes creates, on my monitor, a less than appealing display. To correct this, and brighten things up a little, I wrote a small TSR program, INTENSE .COM, that forces the brighter color palette to be used. Interrupt 10h function 0Bh is used to select the color palette used in graphics mode. When loaded, INTENSE intercepts this call and changes the requested palette to include the brighter colors.

```
N INTENSE.COM
A 100
JMP   010F
CMP   AH,0B
JNZ   010A
OR    BL,10
JMP   0000:0000
MOV   AX,3510
INT   21
MOV   [010B],BX
MOV   [010D],ES
MOV   DX,0102
MOV   AX,2510
INT   21
MOV   AH,49
MOV   BX,[002C]
MOV   ES,BX
INT   21
MOV   DX,010F
INT   27

RCX
33
W
Q
```

Figure 1: *The DEBUG script used to create the program INTENSE.COM.*

Dwayne Budzak
Edmonton, Alberta
Canada

The CGA medium-resolution colors are quite murky—it's a mystery why they were chosen as the default. But this small TSR can fix that oversight.

To create INTENSE.COM, type the INTENSE.SCR DEBUG script file (Figure 1) using a pure-ASCII text editor such as WordPerfect*'s Program Editor, or the DOS command*

```
COPY CON INTENSE.SCR
```

Be sure to hit the Enter key at the end of each line, especially the last one, and a blank line above RCX. Then, get back to DOS and type

```
DEBUG < INTENSE.SCR
```

to create the executable file.

The program INTENSE should be loaded only once, preferably in your AUTOEXEC.BAT file, before any programs using the medium-resolution graphics mode are run.—Robert L. Hummel

USING APPEND WITH BASICA

I have discovered a problem that occurs when using the DOS 3.3 APPEND command and BASICA. If I have APPEND loaded and execute the demonstration BASIC program shown in Figure 2, the file FILEA.TXT, located in a directory that is included in my APPEND path, will be overwritten by the BASIC program. Although the program should create a new file in the \TMP directory, it doesn't.

```
10 OPEN "\TMP\FILEA.TXT" FOR OUTPUT AS #1
20 PRINT #1, "Creating \TMP\FILEA.TXT"
30 CLOSE
40 SYSTEM
```

Figure 2: *A sample BASIC program that demonstrates a potential problem using APPEND with BASICA.*

If there is no existing file named FILEA.TXT along an APPEND path, then things will work as expected. Otherwise, important data is at risk.

Dave Bartholomew
Oakland, California

The APPEND command carries with it several caveats that users need to be aware of—this is one of them. APPEND loads as a TSR and monitors all DOS file apen requests. When a file open request is processed and the file cannot be found, APPEND then steps in and attempts to find a file of the same name in any of the subdirectories in its "path." If it finds one, it substitutes it far the requested file. The calling application never even knows that this has happened.

This substitution, however, can be dangerous in certain situations. The problem lies with the way BASICA determines whether it should try to open an existing file or create a new one. The same BASIC language statement, the "OPEN" statement, is used for both.

When BASICA processes the "OPEN" statement, it uses a two-step approach. First, it assumes that the file exists and at-

■ USER-TO-USER

tempts to open it using the DOS open file handle *function. Then, if the file does not exist, it creates it using the DOS* create file handle *function.*

This process works just fine without APPEND. With APPEND loaded, however, instead of failing because the requested file doesn't exist, the open file handle function can be satisfied by any *file of the same name* anywhere *in the APPEND path. This makes deliberately creating a new file difficult if one with the same name already exists somewhere in the APPEND path—because BASIC will never get to step two of its two-step sequence for opening a file.*

The best solution is to not use the APPEND command. And you don't have to if your application supports subdirectories. APPEND's main purpose is to provide subdirectory access to applications that were written before DOS 2.0. But if you must use APPEND, try the following.

*If the intent is to create a brand-new file, precede the OPEN statement with an OPEN "*filename*" FOR INPUT statement. If this call fails (trap the error using ON ERROR), you can assume the file does not exist in the current directory or in the APPEND path. If the call succeeds, a file with that name exists somewhere in the APPEND path, and caution is needed.*

What if you want to update the file \TMP\FILEA.TXT if it exists, but create it if it doesn't? Unfortunately, with APPEND loaded, there is no way of knowing whether a successful OPEN has opened the requested file or one somewhere in the APPEND path. The BASIC program must take responsibility for retrieving the APPEND path from the DOS environment and searching through it for files of the same name before attempting to open the file. To make this step possible, the APPEND command provides the /E option, which causes the APPEND path to be placed in the DOS environment. From there, it can be retrieved using the BASIC ENVIRON$ command.

The DOS reference manual's explanation of APPEND implies that reading a file, then writing it, may not write the file in the expected directory. It also cautions against using the DOS APPEND command along with the APPEND command from either the IBM PC Network Program, *Version 1.00, or the IBM* PC Local Area Network Program, *Version 1.10. Users of APPEND would be wise to read the DOS manual section on APPEND thoroughly before using it in their applications.*

—Salvatore P. Ricciardi

"SMART" BATCH FILES

Integrated environments are great—they include an editor, a compiler, a linker, and even a make facility. And while many popular languages have this support, there are still some that do not. If you're using one of these (such as MASM or IBM CO-

BSI HIGH PERFORMANCE COMPUTERS

BSI 386 System
- 16 MHz microprocessor
- 2 MB 32-bit memory on main board
- One 32-bit expansion slots
- Socket for 80287 math co-processor
- Floppy/hard disk controller
- One 1.2 MB floppy disk drive
- 40 MB hard disk drive
- Enhanced 101-key keyboard
- Monochrome graphics card with printed port
- Serial/parallel port
- 200 Watt power supply

$ 3,150.00

LCD Portable 286 AT
- 6/12 MHz 80286 processor
- 640K memory on main board
- New supper twist LCD with backlit and Reverse; 640 X 200 dots; 80 X 25 characters
- Monochrome/color graphics card for external monitor
- Socket for 80287 math co-processor
- Floppy/hard disk drive
- Serial/parallel/clock-calendar
- One 1.2 MB floppy disk drive
- 20 MB hard disk (40 MB option)
- 12 function AT style keyboard

$ 1,895.00

For orders only, call toll free :

1-800-872-4547

BSI customer support center:
(818) 442-7038

Dealer Inquiry Welcome

- Laptop portable AT
- CRT portable AT & XT
- LCD portable XT
- Desk top AT & XT

are available, please call for prices. All BSI systems are backed by a limited warranty.

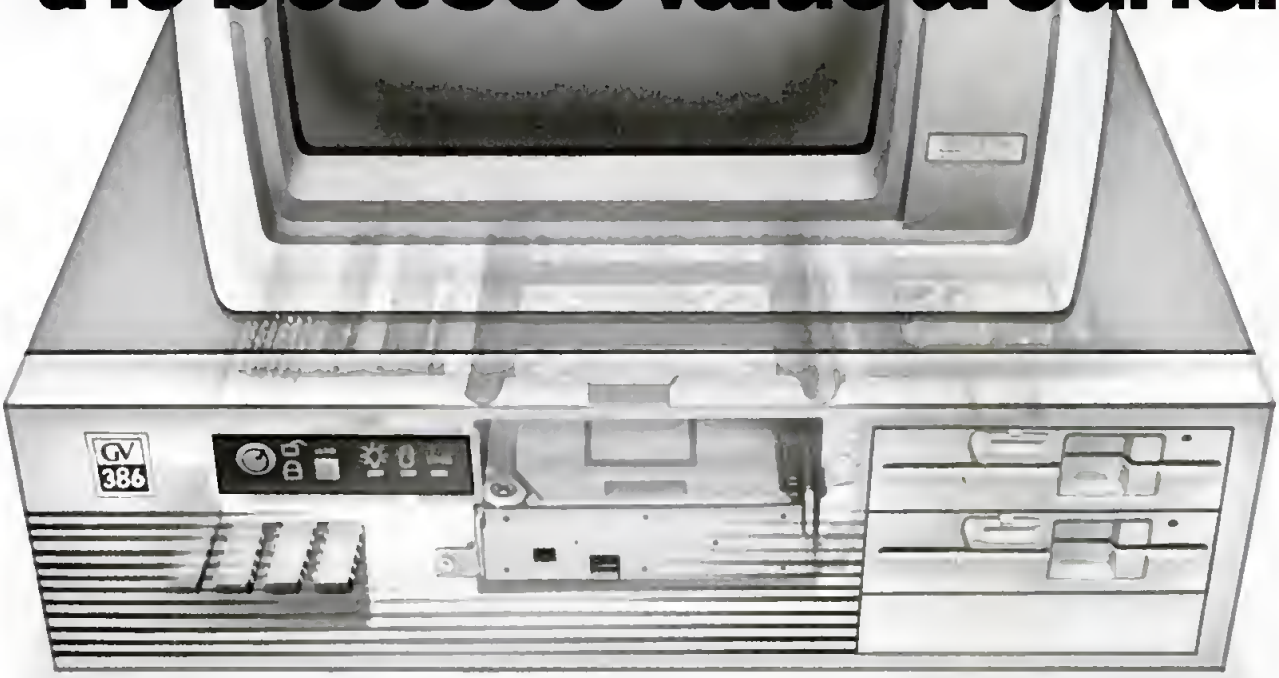
BSI
9440 Telstar Ave , Suite 4
El Monte, CA 91731
Tel · (818) 442-0020

IBM/PC AT, XT are trademarks of International Business Corp

MasterCard VISA

CIRCLE 296 ON READER SERVICE CARD

An inside look at the best 386 value around.



The more you look into 386 compatibles, the more you realize that well thought-out design innovations (that really work) are few and far between.

That's why our engineers set out to design the GV-386. They realized they could unlock more of the chip's potential, if only they could speed up data retrieval, without affecting system reliability.

INNER POWER

Here's how they did it: a high-speed RAM cache circuit—a full 64K of superfast memory—that puts your most frequently accessed data right at your fingertips. If you're ever involved in processing complex databases, long spreadsheets, or detailed engineering drawings, you'll see the value of this innovation in a second...literally.

Best of all, the cache circuit actually makes the GV-386 more reliable than other high-speed machines, by sparing integrated circuits from harsh overloading.

QUALITY THROUGHOUT

Of course, our most important criterion when designing our super compatible wasn't speed—it was quality. Take a look inside the GV-386 and you'll see it everywhere: from the highest quality components available to the intelligent use of special CMOS RAM to store system set-up information. On the outside, the fit and finish of the GV-386 would make Big Blue green. Even the user's manual has impressed users and reviewers alike.

We'd like to tell you more about what went into the GV-386. Give us a call and we'll give you the whole story. We'll also tell you about our exclusive 30-Day Compatibility Guarantee, our full One-Year Warranty and our toll-free support service.

The GV-386 from PC Designs. With design innovations this advanced, at this price, it's an open and shut case.

GV-386 Specifications

- ❑ Available with 16MHz or 20MHz CPU
- ❑ Zero Wait States
- ❑ 64K Cache (keyboard enabled)
- ❑ 1MB RAM on-board, expandable to 4MB
- ❑ Socketed for 80287 or 80387
- ❑ I/O Bus runs at 8MHz for hardware compatibility
- ❑ Six 16-bit slots; Two 8-bit slots
- ❑ Price: 20MHz systems start at $2,750; 16MHz systems as low as $2,375

PC Designs

Call us now at 1-800-32-BIT PC
(800-322-4872)

2500 N. Hemlock Circle, Broken Arrow OK 74012
• 918-251-5550 (Fax 918-251-7057)

19 Rector Street, Suite 2705, New York, NY 10006
• 212-514-7280 (Fax 212-797-3973)

Our BBS is on-line 24 hours
Call The Soft Stop at 918-252-9137

Prices subject to change

CIRCLE 372 ON READER SERVICE CARD

■ USER-TO-USER

BOL/2) or simply prefer another editor, you can still move fairly quickly between the basic components of program development by using "smart" batch files.

For example, after invoking MASM use the following batch file:

```
ECHO OFF
REM SMART.BAT
ECHO %0 %1 > C.BAT
ECHO LINK %1; > L.BAT
ECHO EDIT %1.ASM > E.BAT
MASM %1;
```

You can quickly reedit the source program if necessary by executing the batch file E.BAT, and then recompile by executing C.BAT. After a successful compile, LINK is at your fingertips with L.BAT.

The batch files are created by redirecting the output of ECHO to a drive/directory in your PATH. The batch files are smart in that they remember the program name that you last worked on. The batch file variable "%0" is useful for specifying the name of the batch file being executed. For example, to create a batch file that can be reexecuted quickly, use the command shown in Figure 3.

```
ECHO OFF
REM A BATCH FILE THAT REMEMBERS YOUR LAST COMMAND
ECHO %0 %1 %2 %3 %4 %5 %6 %7 %8 %9 >REDO.BAT
```

Figure 3: *A batch file that remembers your last command.*

Brian E. White
Richmond, Virginia

All programmers find the edit-compile-link process fatiguing. But if you can't—or won't—use an integrated environment, these batch files really help.

To create a batch file that links as well as compiles, add the following line to the end of SMART.BAT.

```
LINK %1;
```

—Salvatore P. Ricciardi

Salvatore P. Ricciardi is a technical editor on the staff of PC Magazine.

SHARE YOUR SECRETS

Reveal your latest DOS and systems discoveries through User-to-User, and we'll pay you $50 or more for any submissions we print, *plus an extra $25 if you submit your letter on a disk.* If you send a disk, please include a printout. Mail your contributions to User-to-User, *PC Magazine*, One Park Avenue, New York, NY 10016.

Sure it's Insured?

Most computers are not insured. And ordinary policies may exclude or limit the coverage you need. Do you have the ready cash to replace stolen or damaged equipment? You will if you have SAFEWARE's comprehensive Computerowners coverage. It provides full replacement of hardware, media and purchased software for just pennies a day! Your protection includes theft, fire, accidental damage, natural disasters like earthquakes, and more. Even costly power surges are covered. Just select your system value and premium from the table below. Use the coupon or call for immediate coverage or more information.

Amount of Insurance	Annual Premium
Up to $2,000	$ 39
$ 2,001-$ 5,000	$ 69
$ 5,001-$ 8,000	$ 89
$ 8,001-$11,000	$109
$11,001-$14,000	$129

Call for rates on higher amounts

Call Toll Free
1-800-848-3469
Local 1-614-262-0559
On CompuServe, GO SAF

SAFEWARE, The Insurance Agency Inc.
2929 N. High St. P.O. Box 02211
Columbus, OH 43202

T-PCM

10 DAY TRIAL. Review your policy for 10 days after you receive it. Satisfaction guaranteed or your money back.

Name _____
Address _____
_____ Phone (Daytime) _____
☐ Check Enclosed ☐ Visa ☐ MasterCard Exp _____
Card # _____
Total value of hardware, media and purchased software $ _____ (Insure to full value)
Your signature _____
Mail to SAFEWARE, The Insurance Agency Inc. PO Box 02211 Columbus, OH 43202

CIRCLE 728 ON READER SERVICE CARD

LANSHARE™

POWERFUL!!

- Centralized LAN SUPPORT and CONTROL software
- Access any workstation's display and keyboard across the network
- Perfect for LAN administration and support
- Provides extensive security options
- Multiple connects allow group authoring of documents, spreadsheets etc.
- Can be used with asynch remote control software
- Uses less than 12K of workstation memory

COMPATIBLE!!

- All IBM NetBios-compatible LAN's
- IBM PC LAN or Token Ring
- AT&T Starlan
- Novell systems
- 3-Com and others

$259.95
System Support Pak

Allows remote LAN Administration and Support on any size network, any number of servers. Other configurations available

MicroNet, Incorporated
2356 Parkside, Boise, ID 83712
CALL (208) 384-9137

CIRCLE 374 ON READER SERVICE CARD

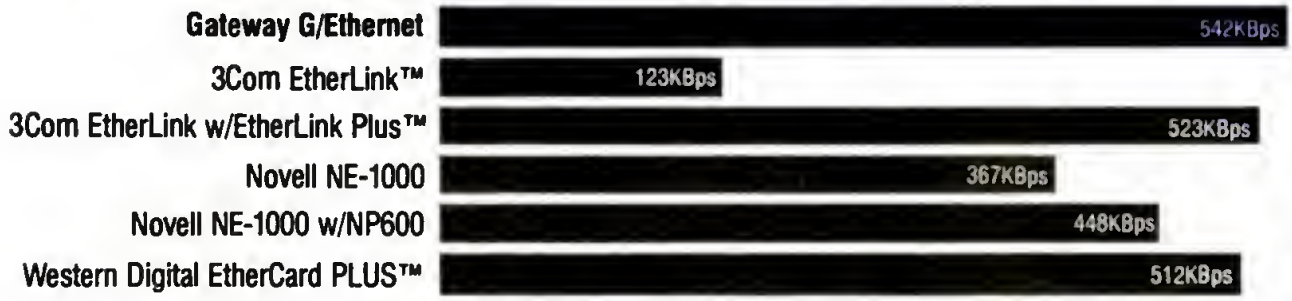
INTRODUCING THE G/ETHERNET™ LAN:

VERY STANDARD

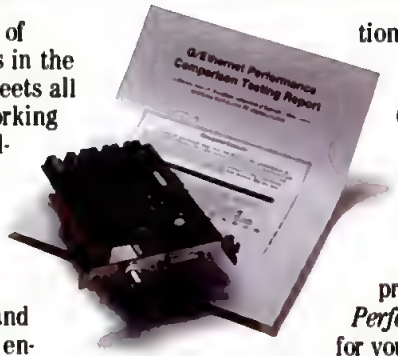
Plug-compatible with other Ethernet® LANs.

VERY FAST

And outperforms the competition every time.*



You want standards. Now the developer of G/Net,™ one of the most popular PC LANs in the industry, has introduced G/Ethernet. It meets all the specifications of the IEEE 802.3 networking standard. And because it follows the standard, G/Ethernet is plug-compatible with most Ethernet cards.



You want speed. With Gateway's G/Ethernet, you get the fastest Ethernet on the market today. As much as 339% faster, and that's without the added cost and complexity of special file server cards. We engineered G/Ethernet to its maximum capacity so that it's capable of handling heavier network loads than most other Ethernets.

You also want expansion capabilities. So G/Ethernet is fully compatible with Gateway's complete line of wide area communications products. Using our multi-user gateways, you can connect G/Ethernet users to a variety of micro, mini, and mainframe resources virtually anywhere in the world. And you can easily bridge G/Ethernet to any number of Advanced NetWare®-based LANs using G/Remote Bridge.™

And you've always wanted support. With G/Ethernet, you get more than just a great LAN. You also get the best support service in the business from a total communications solutions company — support enjoyed by over 100,000 satisfied G/Net users.

G/Ethernet is available from your local Gateway reseller right now, with virtually all versions of Novell Advanced NetWare. And because we were the first LAN vendor ever to run NetWare, nobody supports NetWare better than we do.

We've got what you want. And we've got proof. Call today for our FREE *G/Ethernet Performance Comparison Testing Report.* See for yourself how G/Ethernet outperforms the competition.

1-800-367-6555
(714) 553-1555 in California

Gateway communications, inc.

2941 Alton Ave • Irvine, CA 92714

NOW AVAILABLE IN MICRO CHANNEL FOR IBM PS/2™ COMPUTERS

*Performance scores based on 10-node LAN tests using Novell PERFORM2 benchmark program. Your actual performance will vary with size of LAN, configuration, and applications. G/Net, G/Ethernet, and G/Remote Bridge are trademarks of Gateway Communications, Inc. Ethernet is a registered trademark of Xerox Corp. NetWare is a registered trademark of Novell, Inc. EtherLink and EtherLink Plus are trademarks of 3Com Corp. EtherCard PLUS is a trademark of Western Digital Corp. PS/2 is a trademark of IBM Corporation. Copyright © 1988 Gateway Communications, Inc. All rights reserved

PCM225

CIRCLE 146 ON READER SERVICE CARD

SORRY, BUT THE NEXT GENERATION DATABASE WON'T SHIP IN JULY.

We're talking about the DBMS you've been hearing about.

The PC database management system that "leapfrogs into the next generation," the "most powerful, easiest to use DBMS ever made for a PC."

But it's not the PC database system that may ship at the end of July. It's here. Now.

MEET THE NEW DBMS STANDARD.

Meet R:BASE.®

Whether you're a novice or an expert, R:BASE is now your best choice for order-entry and inventory control, personnel and payroll, or any other database application, large or small.

But you don't have to take our word for that:

"It combines the ease of use a novice requires with the sophistication and power a professional demands. R:BASE for DOS is clearly the best general-purpose PC DBMS available today."

—*PC Week*

NOBODY LIKES DOING THINGS THE HARD WAY.

So R:BASE uses its advanced technology to let you do everything, even create complete applications, without learning any commands.

Screens, forms and reports are all laid out visually, so what you see is what you get.

For data management on the fly, R:BASE uses PBE (Prompt By Example) instead of QBE (Query By Example) because queries aren't all you need to do. Just select tasks and R:BASE does them, helping you with menus, prompts and on-line help.

To automate your database needs, you can record all your keystrokes in the interactive mode, then play them back later.

Or use our second-generation application generator to quickly and easily create user-friendly

IF YOU DON'T WANT TO READ ALL THAT, READ THIS:

Easy-to-use Prompt-By-Example (PBE) does *everything* because queries (QBE) aren't all you need to do.

WYSIWYG screens, forms and reports.

Automatic applications for novices and quick prototypes for power users with no programming, no commands.

Really easy SQL that even novices can use with menus, prompts and on-line help.

LANs are free for up to 3 users, with full concurrency control down to the item level.

Real OS/2 means that R:BASE is the *only* PC DBMS that gives you multi-tasking, automatic caching, etc.

Share micro data by importing/exporting dBASE,® Lotus,® Multiplan,® ASCII files or import from pfs:file® and dBASE II.®

Share mainframe data from SQL/DS, Ramis II, SAS, etc. through Lotus' The Application Connection.®

Companion products include: network six-pack and unlimited LAN versions; runtime; business graphics; Program Interface to C, Pascal and FORTRAN, *English* as a query language.

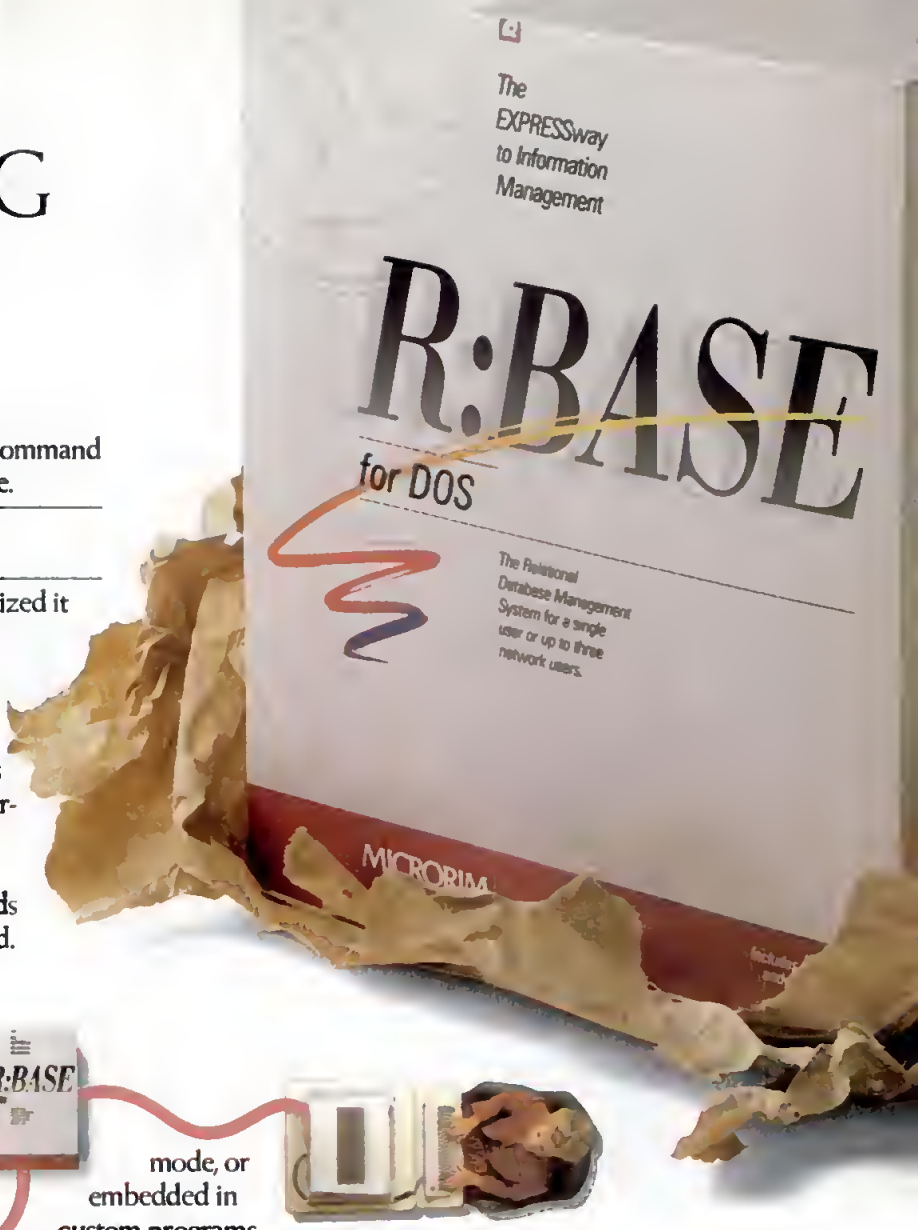
WYSIWYG screens forms and reports.

You'll have to see it to believe it.

d way

R way

IT'S SHIPPING NOW.



applications without learning a single command or writing a single line of program code.

IS R:BASE FAST? IT SCREAMS!

We rewrote R:BASE in C and optimized it for speed.

Then made it smarter, so database operations like SORT, VIEW and CROSSTAB are up to 20 times faster because R:BASE automatically chooses the fastest way to get the information you need.

And our built-in intermediate code compiler adds another giant burst of speed.

MORE POWER THAN YOU MAY EVER NEED.

With no programming, novices and experts can quickly and easily include advanced features like data validation. Computed values and conditions. Look-up capabilities. Even relational links for order-entry or invoicing systems so that data is entered into or retrieved from multiple files.

Or you can work directly with R:BASE's extensive programming language, or easily build on the code produced by our application generator.

R:BASE supports up to 80 tables (data files) in a database. Provides scores of scientific and business functions, powerful commands, password protection and keyboard macros. Has a *really* easy to use SQL that can be used with menus, in command mode, or embedded in custom programs. Includes an intermediate-code compiler that generates fast, efficient code. Offers a runtime package. And more.

LAN'S, OS/2™ AND A WHOLE LOT MORE.

R:BASE for DOS comes out of the box with support for up to 3 LAN users (more available), with concurrency control down to the item level. And R:BASE for OS/2 has the same features and facilities with the added bonus of multi-tasking—so anyone can do several things at once—and even faster performance.

With all this, R:BASE for DOS (1-3 users) is just $725; R:BASE for OS/2 (multi-tasking) is $895. Check it out with your nearest dealer, or contact: Microrim, Inc., P.O. Box 97022, Redmond, WA 98073.

What are you waiting for? Call 1-800-624-0810 today.

R:BASE
From Microrim

From Alaska and Canada, call 1-206-867-1800 Department PCM788 Microrim and R:BASE are trademarks of Microrim, Inc Other products and services mentioned are not ©Microrim 1988

CIRCLE 176 ON READER SERVICE CARD

NOW... 20 MHz DATA 286

SI: 22.5 (V 3.0)

REGARDLESS OF WHICH SYSTEM YOU WANT... IF YOU CARE WHAT YOU ARE GETTING...

ASK	DATAWORLD'S ANSWERS
Speed of CPU .. Rating ?/ Running at ?	We have 80286-10 running at 10 MHz, and 80286-16 running at 16 or 20 MHz
Wait States ? Switchable ?	0/1 switchable on most systems
Is memory "paged" ?	Non-paged is faster
Interleave factor on HD controller ?	1:1 available
What type interface used .. SCSI, ESDI, ST506/ST412 ?	We have them all
What is the data transfer rate ?	You can get well over 400,000 bits/sec without using RLL
Does your EGA offer 640 x 480 resolution ?	Yes
Whose Floppy Drives are used ? All are not equal	Our 1.2 MB Floppy Drive will read and write to your 360 diskettes
Do you have a toll-free tech assistance line ?	Yes
Is your 30-day money-back guarantee "no-questions-asked" ?	Yes
Can you ship now, or are you quoting on something not yet out ?	We can ship

DATA-286 20MHz

80288 running at 20/10MHz. Phoenix or Award BIOS
1 MB of RAM expandable to 16 MB (2 MB on board)
W.D. 1:1 interleave dual hard disk controller
101-key keyboard with "click". Socket for 80287
EMS 4.0 support for memory over 1 MB. Real time clock
Monographics card w/parallel port. TTL Monitor included **$1555.00**

DATA-286 10MHz

80288 running at 10/6MHz. Phoenix BIOS
512 KB of RAM expandable to 16 MB (1 MB on board)
One 1.2 MB floppy drive. Dual floppy drive controller
101-key keyboard with "click" Socket for 80287
Real time clock with battery back-up. 200W power supply
Monographics card w/parallel port, TTL Monitor included **$895.00**

DATA-286 12MHz AVAILABLE

Vertical Case

● Front Panel On/Off Switch ● 220 Watt Power Supply ● Six Half Height Drive Bays ● Dimensions 16¾"(D) x 7⅜"(W) x 25⅜"(H) ● AVAILABLE on 286/386 Models ●

Data-386

0 wait state ● 16MHz (20MHz opt) ● 1MB RAM (2MB opt) ● 1.2MB FDD ● 101 Key "click" touch K/B ● Reset push button ● 7 EXp slots ● Mono cards & monitor **$2175**

Portacomp

80286CPU 12/8MHz ● 0/1 Wait ● 512 K RAM (Exp to 1024 K) ● 5 Exp slots ● Phoenix BIOS ● 1.2 MB Floppy drive ● 20 MB Hard Disk Drive ● 200W P/S ● Supertwist backlit LCD 640 x 200 25 lbs. ● Par Ser Game Ports ● RGB Output **$1785**

Portacomp II

80286CPU 12/6MHz ● 0/1 Wait ● Click K/B ● 512 K RAM (Exp to 1024K) ● 4 Exp slots ● Phoenix BIOS ● 720 KB Floppy drive ● 20 MB 39ms. Hard Disk Drive ● Supertwist backlit LCD 640 x 400 ● 20 lbs. ● RGB Output ● Opt Ext 5¼" Drive **$1975**

Prices subject to change.
No charge for credit card, check, COD. 30 day moneyback guarantee (Shipping charges non-refundable).

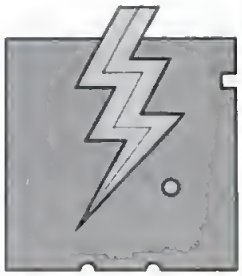
Dealer/overseas inquiries welcome
In-Calif. 1-800-722-7734
Out-Calif. 1-800-722-7702

A PREFERRED COMPUTER SYSTEM

DATAWORLD®

3733 San Gabriel River Parkway, Pico Rivera, CA 90660-1495

■ EDITED BY CRAIG L. STARK



POWER USER

Identifying the current drive and subdirectory in Clipper and dBASE III Plus; creating concordance files in WordPerfect; checking single-word spelling in Microsoft Word.

SPEEDING UP WP

While putting *WordPerfect*'s dictionary and thesaurus on a RAMdisk speeds up their use, the *WP* manual overlooks the speed advantage you can gain by copying WP.EXE and the necessary auxiliary files to the RAMdisk as well. Loading becomes nearly instantaneous, even using WP/R, and more important, moving through long documents is significantly faster.

The copy of *WP* on my RAMdisk requires its own {WP}SYS.FIL, which you must create using *WP*'s setup command (WP/S). I store this new file in the WP directory on my regular hard disk under the name {WP}DSYS.FIL, and I have my AUTOEXEC.BAT rename it {WP}SYS .FIL when copying this and the other needed files to the RAMdisk.

In the setup file, I specify that the automatic backup files reside on the hard disk, since a system crash would destroy them if I put them on the RAMdisk.

Joel Samoff
Palo Alto, California

Readers should note that this plan requires a large *RAMdisk. The overflow files ({WP}.TV1, {WP}.BV1) for large documents can total nearly the size of your work file. If, after all of the* WP *files are copied to the RAMdisk, the remaining disk space is greater than the size of your work file, you should have no trouble.*
—Neil J. Rubenking

CONCORDANCE CONSTRUCTION

When indexing a large document, the concordance feature of *WordPerfect* makes it unnecessary to mark each occurrence of a word manually. Creating the concordance file directly from the primary document is fast and easy with the two macros shown in Figure 1.

To add a word to the concordance file (created as document 2), simply place the cursor on the first letter of the word and press Alt-I. To add text longer than one word, first block the text and then press Alt-Y. The macros automatically append the word or phrase you chose to the end of document 2.

Having these two macros, I can now go through a hard copy of a document and highlight what I want indexed. My secretary simply scrolls through the document and invokes the appropriate macro at the points I marked. I can later edit the concordance file and eliminate duplications by sorting the file.

Nick Dimas
San Antonio, Texas

Do remember to save *the file you create in document 2. You will definitely want to look it over before using it, because it's likely to have a few stray characters. For example, if you choose the last word in a sentence, the period will appear in the*

```
<Ctrl-F10>              Begin macro definition
<Alt-I>                 Attach this macro to Alt-I
<Alt-F4>                Block on
<Ctrl-Right>            Mark the current word
<Left>                  Don't include the space after it
<Ctrl-F4>2              Copy the block
<Shft-F3>               Switch documents
<Home><Home><Down>      Go to the bottom
<Ctrl-F4>5              Retrieve the word
<End><CR>               To end of line, then a carriage return
<Shft-F3>               Back to Doc 1
<Ctrl-F10>              End macro definition

<Ctrl-F10>              Begin macro definition
<Alt-Y>                 Attach this macro to Alt-Y
<Ctrl-F4>2              Copy the block
<Shft-F3>               Switch documents
<Home><Home><Down>      Go to the bottom
<Ctrl-F4>5              Retrieve the word
<End><CR>               To end of line, then a carriage return
<Shft-F3>               Back to Doc 1
<Ctrl-F10>              End macro definition
```

Figure 1: *The two macros used to create a concordance file for words and phrases in* WordPerfect.

Zero. Learning Curve

SPF/PC™

"The best editor by far for MVS programmers."
AT&T, White Plains, NY

"This product is superb! There is absolutely no learning curve if one is already familiar with IBM's mainframe ISPF."
Reader's Digest, Pleasantville, NY

"SPF/PC is probably the most outstanding utility we have."
USAF, Pentagon, Washington, D.C.

"With 15 years of mainframe programming, I find SPF/PC to be the friendliest software on the PC."
Dun & Bradstreet, Basking Ridge, NJ

"Your product allows our programming staff to move from our IBM mainframe to PC's very easily, saving us time and money."
Certified Grocers of California, Los Angeles

Want more proof? Call or write for a free demonstration diskette.

SPF/PC, so much like the mainframe you'll forget you're editing on a PC.

CTC
Command Technology Corporation

1900 Mountain Blvd., Oakland, CA 94611
Telepone: (415) 339-3530
Telex: 509330 COMMAND TECH

CIRCLE 188 ON READER SERVICE CARD

■ POWER USER

concordance file. But the editing is easy, much easier than creating the concordance without help.—Neil J. Rubenking

SINGLE-WORD WORD CHECKING

In the Power User of December 8, 1987, Jim Levitt suggests using *Microsoft Word*'s Library Run command and running WORDFIND to check the spelling of single words. However, if you highlight the word and hit Ctrl-F6, the thesaurus will not only tell you if you misspelled the word but will list words that are similar to it. Also, if you are unsure how to spell a word, you can type as much as you know and hit Ctrl-F6.

Dan Nebres
Everett, Washington

You can indeed use the thesaurus as a quick and dirty spell checker, but it's not really designed with that purpose in mind and will often find a root word when what you really want to know is the right spelling for the suffix. (Is it ignoring *or* ignoreing? *Either one will find* Ignore *in the thesaurus.) I prefer to spell-check the entire document at once, after I've finished writing it. But for those who can't wait, WORDFIND is often the better choice in* Word, *Version 3.1.*

If you decide to upgrade to Word, *Version 4.0 (and you should), you won't find WORDFIND on your disk. Instead, you can check a single word by hitting Alt-F6 to start the spelling checker, then using the new Lookup choice on its main menu. This is still nowhere near as slick as, for example, the spelling checker in* WordStar, *Version 4.0—which will look up words and insert them in the text for you without ever leaving the document—but it's definitely a step in the right direction.*
—M. David Stone

dBASE CALL HOME

dBASE III Plus does not include any built-in function you can use to identify the current DOS drive and directory. Fortunately, however, DOS's interrupts 21h and 47h provide this information directly.

Enter the DEBUG scripts shown in Figures 2 and 3 with any word processor that produces a pure ASCII output. Be sure to end each line with a carriage return, including the blank line after RETF. To create the .BIN files, make sure DEBUG is on the DOS path and issue the following commands:

```
DEBUG < GETDRIVE.SCR
DEBUG < GETDIR.SCR
```

Then, inside your *dBASE III Plus* program, you can CALL for this data with

```
STOR " " TO curdrive,curdir
LOAD getdrive
LOAD getdir
CALL getdrive WITH curdrive
CALL getdir WITH curdir
RELEASE MODULE getdrive,getdir
```

Kevin Owens
Lake Charles, Louisiana

```
N GETDRIVE.BIN
A100
MOV SI,BX
MOV AH,19
INT 21
ADD AL,41
MOV BYTE PTR [BX],AL
INC BX
MOV BYTE PTR [BX],3A
INC BX
MOV BYTE PTR [BX],0
RETF

R CX
13
W
Q
```

Figure 2: *The DEBUG script shown above produces GETDRIVE.BIN, which can be CALLed from* dBASE III Plus *to identify the DOS default drive.*

```
N GETDIR.BIN
A100
MOV SI,BX
MOV DL,0
MOV AH,47
INT 21
RETF

R CX
9
W
Q
```

Figure 3: *A DEBUG script for GETDIR.BIN. LOAD and CALL this binary from* dBASE III Plus *to identify DOS's current directory.*

Choose your favorite. $525

We're not selling printers, but a new networking device that'll make it seem like you have an extra one. Or two or three.

The Buffalo® SX can actually multiply the effectiveness of laser printers, dot matrix and daisy wheel printers, modems, and plotters. Anyone can send work to any printer—even when it's busy—and go back to work immediately. So it can save you thousands of dollars on extra printers you *don't* buy.

All the right connections

The Buffalo SX is an intelligent buffer, switcher and interface converter all in one. It allows several PC users to select any output device connected to the network.

There are ten ports—five parallel and five serial. Five can handle either input or output. So you have lots of options. Seven PCs sharing three peripherals. Two PCs sharing eight peripherals. Or any combination between.

But that's only the beginning. You can link more SXs together to share a set of peripherals with *any number* of PCs (of course, when you get up into the dozens, you might need another laser).

Power windows & automatic transmission

To set up the SX, just plug it in and define the ports using the switches and software provided. Concise documentation tells you how. If you have a question, call our toll-free support line.

When someone's ready to print, they simply use the handy little menu that pops up on screen with the names you've chosen. Call your printers Martha, Chatterbox, Relic, whatever.

The SX does the rest. It handles interface conversions, making parallel and serial machines work together. Yes, it even lets IBM® PCs, Macintoshes® and HP 3000s share a laser with no fiddling. And PCs can exchange files with communications software.

Best of all, it stores print jobs in its large buffer and feeds data to the printers automatically. So people can use their computers within seconds. ("Large" means a standard 256K memory, expandable to one full megabyte)

Free software bonus

Order now and receive $100 worth of productivity tools free:

O HyperKey™ Keyboard Enhancer—increases speed and accuracy dramatically. Instant on-off for repeat keys!

O HyperDrive™ Disk Caching—makes applications run 3-5 times as fast. Fully utilizes Above™ Board memory.

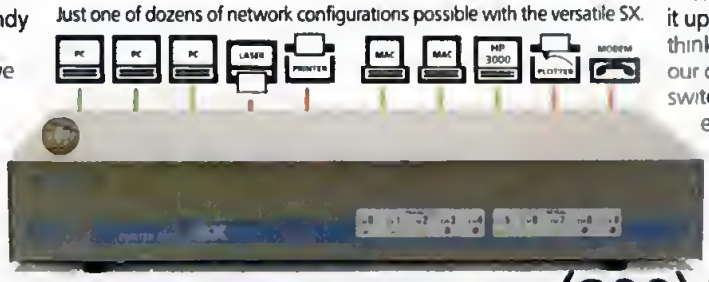
O Print Booster™ for 1-2-3®—frees your PC about four times faster when printing graphs.

All you stand to lose are long coffee breaks

If you've tried a printer buffer, you know how limited most are. The SX is different. It's the slickest productivity booster this side of a $10,000 LAN. It's so dependable, it comes with a full one-year warranty. Plus this money-back guarantee.

Order a Buffalo SX. Try it for 45 days. If you can part with it, send it back for an immediate refund. No questions asked. And you can keep the productivity software.

Just one of dozens of network configurations possible with the versatile SX.



We're certain you *won't* give it up once you've tried it. We think you'll add more. Ask about our other low-cost buffer/switchers too. There's one for every application imaginable.

Call now. Use Visa, MasterCard or American Express. You'll save hours of frustration. Plus the cost of another laser!

Buffalo Products, 2805 19th Street SE, Salem, OR 97302 (503) 585-3414. Call Toll Free: (800) 345-2356

BUFFALO

© 1988 Buffalo Products. Buffalo is a registered trademark of Buffalo Products, Inc. HyperKey and HyperDrive are trademarks of HyperWare. Print Booster is a trademark of Buffalo Products. IBM, Macintosh, and 1-2-3 are registered trademarks of International Business Machines, Apple Computer and Lotus Development. Above is a trademark of Intel. Logotypes shown above are trademarks of their respective manufacturers.

CIRCLE 328 ON READER SERVICE CARD

ERASE. ARE YOU SURE?

Every computer user faces this question in some form each day. To erase or not to erase. To save or not to save, when saving means overwriting the previous version of a file. If you answer yes and you're wrong, *countless hours of work will be wiped out by a single keystroke!* And there won't be anything you can do about it, unless you're backed up.

Disk failure, theft, power surges—any of these can sneak up on you when you least expect it. However you look at it, backing up important files is essential. And nothing will make a believer out of you like finding out, just once, that you weren't as sure as you thought.

MaynStream: A Sure Thing.

MaynStream is a file-by-file backup system that protects information on your drive by copying it onto a special tape and restoring it from the tape to any drive you specify, on command. With MaynStream, backup is a breeze. You'll see all the options you need right on the screen. In seconds, you can easily customize the backup process to work the way that's best for you.

Backup Is Just The Beginning.

MaynStream's pull-down menus make it remarkably easy to back up, restore, assign names to frequently backed-up groups of files, select optional password protection, and more! And context-sensitive, on-screen help is just a keystroke away.

And, because MaynStream is completely portable and compatible with all PC and PS/2 systems, you can use a single MaynStream to back up all the personal computers in your office—whether you have a classic PC or compatible, or a PS/2 Model 30, 50, 60, or 80! Plus, MaynStream is Novell-approved, and works with all popular LANs including Novell, 3COM, and IBM's PC Net.*

The Inside Track

MaynStream is also offered for internal installation in the PC or compatible, and in the PS/2 Models 60 and 80. Plus, it comes with a number of faceplates designed to match today's most popular computers.

MaynStream, from Maynard Electronics. Backed by our 1-year warranty and Technical Support Team. In these uncertain times, it's one thing you can be sure of.

MAYNSTREAM. YES I'M SURE!

MaynStream is available in 20, 60, and 150MB cassette or cartridge models and foreign language versions.

Call us today for the name of your nearest authorized dealer or more information on today's leading tape backup system.

Maynard Electronics
We're backing you one-hundred percent.
460 E. Semoran Blvd., Casselberry, FL 32707 407/331-6402

*IBM, IBM PC, PS/2, and PC Net are trademarks of International Business Machines. 3COM is a trademark of 3COM Corporation. Novell is a trademark of Novell, Inc. MaynStream is a trademark of Maynard Electronics Inc.

CIRCLE 495 ON READER SERVICE CARD

■ POWER USER

Mr. Owens's excellent utilities are much faster and easier than the programming approach I've used in the past to get this information.

GETDRIVE returns the current drive as a 2-byte string: the drive letter plus a colon. GETDIR returns the current directory without its initial backslash. For example, if your computer is set on a subdirectory called \PC\UTIL, a CALL to GETDIR will return the 7 bytes PC\UTIL. Moreover, if you are on the root directory, GETDIR will return a null string (zero length). So in order to produce the same results as the DOS CD command, you must add the leading backslash, thus:

```
dos_cd=curdrive+"\"+curdir
```

Unfortunately, dBASE *versions before* III Plus *cannot CALL binaries. The programming alternative involves RUNning CD and redirecting its output to a temporary text file; APPENDing this text file into a two-field database; and then STORing the contents of its one record to a pair of memvars.*

Users of Wordtech Systems' DBXL *or* Quicksilver *may use these binaries as is, but* FoxBase Plus, *Version 2.0, employs DOS registers differently, and these routines will not run properly without change. The newest* FoxBase *(Version 2.1) has direct functions to derive both the current drive and the directory.* Clipper *users should see the submission from Sean Stephens that follows.*—Brad Stark

CURRENT DR/SUBDIR IN CLIPPER

Clipper has no function for determining the current drive, and this information can be critical when, for example, the user is logged onto one drive but is executing a program from another, or when he must copy files between two drives.

I use the DOS internal VOL command, *Clipper*'s SAVE SCREEN, and substring-

```
SAVE SCREEN TO o_scr
CLEAR
! VOL
SAVE SCREEN TO n_ecr
cur_drv=SUBS(n_scr,AT('d',n_ecr)+12,1)
*cur_drv ie letter of current drive
REST SCREEN FROM o_ecr
RELE n_ecr,o_ecr
```

Figure 4: *A* Clipper *routine that stores DOS's current drive to a memory variable.*

```
SAVE SCREEN TO o_scr
@ 0,0
RUN cd
SAVE SCREEN TO n_scr
ptr=1
dos_cd=SPAC(0)
DO WHIL SUBS(n_scr,ptr,1)>" "
 dos_cd=dos_cd+SUBS(n_scr,ptr,1)
 ptr=ptr+2
ENDDO
REST SCREEN FROM o_scr
RELE n_scr,o_scr
```

Figure 5: *An alternate routine that finds both drive and subdirectory.*

ing to provide the current drive letter (see Figure 4). *Clipper* saves screens as alternating characters and attribute bytes. I locate the *d* from the word *drive* in VOL's output, then count over 6 letters and 6 attribute bytes to locate the drive letter. This is stored to the memory variable CUR_DRV as the character *A, B, C,* or whatever.

Sean Stephens
Houston, Texas

Usually, you need both *the drive and current subdirectory, so here are a couple of approaches to that end.*

Users of Clipper*'s newest ("Summer '87") version can STORE the current subdirectory directly with this undocumented function built into the program's EXTEND.LIB:*

```
<memvar>=CURDIR("<DriveLetter>")
```

The DriveLetter in this case can be supplied using Mr. Stephens's routine.

Figure 5 is a takeoff on his creative idea, substituting DOS's CD for VOL. This has the advantage of providing both the drive and subdirectory in one step, and it can be used with older versions of Clipper.—Brad Stark

SHARE YOUR POWER

Tell fellow users about your latest technical tips for hardware and software applications (other than spreadsheets, networks, languages, or DOS) through Power User, and we'll pay you $50 or more for your trouble, *plus an extra $25 if you submit your letter on a disk.* If you send a disk, please include a printout. Mail your contributions to Power User, *PC Magazine,* One Park Avenue, New York, NY 10016. PC

ZyINDEX™
"A Word Crunchers Dream"
—PC Magazine June '87
#1
IN FULL TEXT RETRIEVAL
SEARCH 5000 TEXT FILES IN 5 SECONDS
RATED 9.3
By INFOWORLD
Find any info created by all the popular word processors or ASCII files in seconds. Highlights finds.
• Comprehensive Searches
Create a search request with any combination of AND, OR, NOT, and WITHIN (WITHIN refers to proximity) Search information on a 20MB Hard Disk in seconds. Works with public data bases like Dow Jones and CompuServe as well as other programs such as LOTUS or dBase III
• Wild Cards • Highlight
• Mark & Save • Phrase Search
• On-Line Help • Nesting
• New Version 3.0
ZyINDEX Personal $ 95
searches 500 files
ZyINDEX Professional $295
searches up to 5000
ZyINDEX Plus $695
searches up to 15,000 files with LAN capabilities
ZyFEATURES $ 95
thesaurus/macros/field search
Call for Demo Diskette
(312) 632-1100
FOR ORDERS AND INFORMATION (800) 544-6339
ZyLAB™ Corporation
3105-T N Wilke Road • Arlington Hts., IL 60004
CIRCLE 316 ON READER SERVICE CARD

BULLDOG WINS 1st PLACE

IBM

PERSONAL SYSTEM/2

Model 30 w/2 floppy **$1250**
Model 30 w/1 floppy & 20 mg. **1795**
Model 50 ..... **2695**
Model 60 - 40/70 ..... **3425/3650**
Model 80 - 40 ..... **4375**
70 ..... **4875**
115 ..... **8195**

90 day warranty through Bulldog

COMPAQ

386 Desk Pro 40/60/130 **$4495/5450/6950**
286 Desk Pro 12 mhz **1695**
Compaq II Model IV **2879**
Compaq Port. 386 Model 40/100 **5699/7199**
Compaq III 20mb/40mb **3595/4195**
VGA Monitor **549**
VGA Card **469**

90 day warranty through Bulldog

MATH COPROCESSORS

803-87-20 ..... **$750**
803-87-16 ..... **475**
802-87-8 ..... **249**
80287-10 ..... **299**
8087-3 ..... **119**
8087-2 ..... **149**
256K Chips ..... **Call**
64K Chips ..... **Call**

COMPATIBLE

TURBO XT

8 mhz, 1 floppy, 640K, AT style keyboard, game port, clock calendar, monographics card, mono monitor **$750**
Color System add **$150** w/20mb add **$279**, w/30 mb add **$299**
90 day warranty through Bulldog

Club AT

10 mhz, 1 mb Ram, 1.2 floppy **$1095**
Club 386 16 mhz, 1 mb Ram, 1.2 floppy **$1850**

Wyse AT Systems

8 mhz, 1.2 floppy, 1 m.b. Ram, serial/parallel port, clock calendar, DOS **$1235**

12 mhz - 0 wait state, 1.2 floppy, m.b. Ram, serial/parallel port, clock calendar, DOS **$1935**

Wyse 386 system, 1.2 floppy, 1 m.b. Ram, serial/parallel port, clock calendar, DOS **$2635**

All Wyse Systems carry a 1 year manufacturers warranty — parts and labor.

LAPTOPS

NEC Multispeed EL **1549**
NEC Multispeed HD **2299**
Toshiba 1000 ..... **750**
Toshiba 1200 ..... **2349**
Toshiba T1100 Plus **1150**
Toshiba 3100 ..... **3095**
T3200 ..... **3795**
T5100 ..... **4895**
Zenith 183 w/20 mb **2050**

GRAPHICS CARDS

ATI VGA **$269**
EVEREX MICRO ENHANCER **135**
GENOA SUPER HI RES **179**
HERCULES GRAPHICS **181**
HERCULES IN COLOR **289**
ORCHID DESIGNER VGA **269**
PARADISE Auto Switch 480 ..... **159**
PARADISE VGA Plus **245**
QUADRAM EGA PLUS **169**
QUAD PRO SYNC **209**
SIGMA COLOR 400 ..... **299**
NEC GB-1 ..... **209**
NEC MVA **795**
STB CHAUFFEUR HT **135**
STB Multi Res. II **169**
VEGA DELUXE **189**
VEGA VGA **265**

MULTI FUNCTION BOARDS

AST Advantage w/128K **$229**
AST Advantage Premium w/512K **449**
AST 6 PACK PLUS w/384K **205**
AST 6 PACK PREMIUM w/256K **199**
AST 5251-11 PLUS Enhanced **589**
AST RAMPAGE 286 ..... **375**
AST RAMPAGE 286-2 for MODEL 50/60 ..... **459**
AST RAMPAGE 286-2 for model 50/60 ..... **459**
AST HOTSHOT **355**
EVEREX MINI MAGIC w/o K **59**
FAST 88/V20 w/Switch **89**
INTEL Above 286 w/512K **369**
INTEL Above PS286 w/512K **399**
INTEL Inboard 386 w/Adapter **1040**
INTEL Inboard 386 for PC w/mb **699**
INTEL Above Board II for PS/2 w/o K **259**
IRMA BOARD II **699**
ORCHID JET 386 w/adapter **975**
ORCHID PC Net Starter Kit **735**
ORCHID Tiny Turbo 286 ..... **269**
ORCHID Ramquest 50/60 w/2mb **659**
ORCHID Twin Turbo **389**

MICE &MISC

GENIUS MOUSE GM6+ **$59**
MICROSOFT w/windows **145**
MICROSOFT MOUSE w/PC paint brush **119**
MOUSESYSTEMS MOUSE **89**
LOGITECH MOUSE C7 Plus **74**
LOGITECH HI RES **99**
KODAK DATA SHOW w/Cooling Fan **750**
MICROFAZER II w/64K **229**

Sales Hot Line 1-800-438-6039

BULLDOG

COMPUTER PRODUCTS

We accept VISA, MasterCard, American Express

3241-E Washington Road • Martinez, Georgia 30907

For returns call: **(404) 860-6899** *In Georgia call:* **(404) 860-7364**

Policy: Add 3% (minimum $10) shipping and handling. Larger shipments may require additional charges. Personal and company checks require 2 weeks to clear. For faster delivery use your credit card or send cashier's check or bank money order. Georgia residents add sales tax. All prices are USA prices and are subject to change and all items are subject to availability. Defective software will be replaced with the same item only. Hardware will be replaced or repaired at our discretion within the terms and limits of the manufacturer's warranty. We cannot guarantee compatibility. All sales are final and returned shipments are subject to a restocking fee. All returns must be assigned an RMA number for return authorization. Call (404) 860-6899.

IN LOW PRICES

PRINTERS

EPSON

LX 800 180 CPS, 30 NLQ	$189
FX 86E 240 CPS, 40 NLQ	339
FX 286E 240 CPS, 40 NLQ	419
LQ 500 180 CPS, 60 NLQ	329
LQ 850 330 CPS, 88 NLQ	519
LQ 1050 330 CPS, 88 NLQ	739
LQ 2500 324 CPS, 108 NLQ	849
EX 800 300 CPS, 60 NLQ	439
Special Tractor for LQ1000	20

OKIDATA

320 300CPS, 62 NLQ	339
321 300 CPS, 62 NLQ	465
390 24 pin 270 CPS, 90 LQ	465
391 24 pin 270 CPS, 90 LQ	639
182 Plus 180 CPS, 30 NLQ	229
192 Plus 200 CPS	339
193 Plus 200 CPS	439
292 Plus 240 CPS, 100 NLQ	439
293 Plus 240 CPS, 100 NLQ	575
294 Plus 400 CPS, 100 NLQ	809
393 450 CPS, 120 LQ	925

TOSHIBA

321 SL 216 CPS, 72 NLQ	469
351 SX 350 CPS, 100 NLQ	950
341SL 216 CPS, 72 NLQ	615

NEC

2200	339
P6/P7	465/619
P5XL/P9XL	850/1030
3550/8850	775/1020

PANASONIC

1080i Model II	199
1091 Model II	209
1092	339
1524	565
1592	415
1595	479
3131/3151	285/439
1524	$565

HEWLETT-PACKARD

Laser Series II	1650

DICONIX 150	325
OTC 850 CPS	1725

DRIVES

Seagate 20mb w/contr. ST225	$269
Seagate 30mb w/contr. ST238	289
Seagate 30 mb for AT ST4038	465
Seagate 40 mb for AT ST251	369
Seagate 80 mb ST4096	750
CMS 5¼" ext. 360K for PS/2	225
CMS 5¼" ext. 1.2 mb for PS/2	259
Toshiba 3½" 720K int.	105
Toshiba 3½" 1.44 mb int.	125
Toshiba 5¼" 360K int.	99
Toshiba 5¼" 1.2 mb int.	110
Micropolis 70 mb	695
BERNOULLI PLUS	3450
BERNOULI BOX II 5¼"	
20 mb internal	955
20 mb external w/card	1195
dual 20 mb external w/card	1795
SYSGEN Durapack single	925
dual external/internal	1695/1395
Plus Hard Card 40	679
Plus Hard Card 20	525
Priam 60 mb AT	769
Priam 43 mb AT	649

MODEMS

Everex 1200 int./ext.	79/115
Everex 2400 int./ext.	139/249
Hayes 1200/2400	279/419
Migent Pocket Modem	125
Practical Peripherals half card 2400 w/Procomm	159
US Robotics 2400 direct internal	169
Ventel Half Card 1200 w/Crosstalk	259
Ventel Half Card 2400 w/Crosstalk	359
Ventel 1200/2400 Plus	239/359

MONITORS

AMDEK

410	$145
Color 722	435

PRINCETON

MAX12	149
HX12	419
HX12E	449
HX9	415
Ultrasync	529

IBM

Mono 8503	$199
Color Display 8512	449
Color Display 8513	515
Color 8514	1150
Magnavox RGB80	259

NEC

NEC Multisync II	589
NEC Multisync Plus	889
NEC Multisync GS	199
NEC Multisync XL 19"	2075

SOFTWARE

Aldus Pagemaker	$459
Chartmaster	205
Clipper	379
Corefast	99
Crosstalk XVI	99
D Base III	379
DBXL	125
Enable 2.0 w/Perspective	379
Fastback Plus	105
Foxbase +	199
Freelance Plus	329
Framework II	379
Harvard Graphics	279
IBM Display Write IV	289
Lotus	309
Lotus Hal	49
Managing Your Money 4.0	125
Microsoft Word 4.0	229
Microsoft Excel	329
Microsoft Windows 386	135
Microsoft Works	129
Multimate Advantage II	269
Multiplan	135
Office Writer 6.0	239
Peachtree II Complete	149
PFS Prof Write	119
PFS Prof File	145
PFS 1st Choice	89
Quantro	149
R Base for DOS	439
Revelation	469
Super Calc IV 1.0	269
Symphony 1.2	439
Ventura Desktop Publishing	499
Word Perfect 5.0	199
Wordstar 2000 + 3.0	239
Wordstar Pro 4.0	209

TAPE DRIVES

Everex 60 m.b. int.teac	$550
external teac	645
Genoa Galaxy 60 mb internal	725
external	799
Achives 40 mb internal	339
Sysgen Quic 60 internal	705
external	755
Maynstream 60 PS/2 w/card for model 50 60 & 80	869
Everex 60 mb Wangtec int.	699
Everex 60 mg Wangtec ext	799

Prices Subject To Change

For Orders Call: **1-800-438-6039**

BULLDOG

COMPUTER PRODUCTS

For shipping & technical call: **(404) 860-6905** or **(404) 860-7364**

CIRCLE 481 ON READER SERVICE CARD

SCSystems

Serving Computer Buyers For Eight Years

1-800-669-9933

Para Asistirle En Espanol
Llame Al Tel 1-800-842-1777

InComm 1200B Int Modem
$62
w/Software

Samsung 14" RGB Monitor
$215
640 x 230
.51 Dot Pitch

Color Graphics Card
$44
Parallel Printer Port

HARDWARE

ACCESSORIES

Copy11PC Brd	$ Call
Masterpiece +	95

COMPUTERS

NEC	
Multispeed	$1429
Multispeed EL	1635
Toshiba	
T-1100 S/Twist	1659
T-3100/20	Call

BOARDS

AST Adv Prem 1mb	$ 419
AST 6Pac Prem 1mb	525
AST Sixpac	115
Hercules Grph +	182
Intel Above 286	Call
Intel Inboard 386	960

EGA BOARDS

ATI EGAWonder	$ 175
Genoa SuperHiRes+	175
Orchid Designer	249
Paradise 480	155
Paradise VGA +XT	259
Paradise VGA Prof	385
Vega VGA	259

EGA MONITORS

Magnavox	$ Call
Princeton U/Sync	509
NEC Multisync 2	619
Samsung	359

HARD DRIVES

Plus Hardcard 20	$ 539
Seagate 125 w/cont	321
Seagate 138 w/cont	411

KEYBOARDS

Keytronics 5151	$ 162
Keytronics 5153	269

MICE

Logitech	$ 68
MS Bus Mouse	Call
Optimouse w/DrHalo	92

MODEMS

Hayes 1200	$ Call
Hayes 1200B	Call
Incomm RPC1200	62
Incomm RPC2400	147
Incomm T1200	76
Incomm T2400	167
Incomm T2400EC	224
USRobotics S1200PC	114
USRobotics S2400PC	160

MONITORS

Amdek 410	$ 145
Princeton MAX15	Call
Samsung RGB	215
Samsung Amber	82

3COM

3C501 ELink	$ 356
3C503 ELink II	359
3C505B ELink Plus	645
3C523 ELink/MC	432

PRINTERS

Citizen	
120D	$ Call
180D	499
MSP-15E	319
MSP-40	285
C.Itoh	
PW 1550S+NLQ	506
PW 8510S+NLQ	401
ProWriter 310	479
ProWriter 315	586
ProWriter C715	925
ProWriter Jr.+	255
StarWriter D10	754
JetSetterLaser	1265
NEC P5XLP	819
NEC P2200	335
Panasonic	
1080I/M2	179
1091I/M2	199
1092I	Call
Star	
NX-1000	179
NX-1000 Color	Call
NX-15	Call
Toshiba	
321SL	500
341SL	Call
351SX	1005

SOFTWARE

ACCOUNTING

DacEasy	$ 54
Dollars & Sense	95
Managing Your $	119

COMMUNICATION

Carbon Copy	$ 108
CrossTalk XVI	89
CrossTalk 4	115
SmartCom II	82

DATABASE

Clipper	$ 370
Data Perfect	255
DBase III	Call
DBXL Diamond	109
Fox Base +	190
Paradox 2.0	Call
Q and A	188
Relate & Report	100

DESKTOP PUBLISHERS

Pagemaker	$ Call
PFS First Pub	55
Ventura	495

GRAPHICS

Chartmaster	$ 199
Printshop	35
Signmaster	Call

INTEGRATED

Ability Plus	$ 139
First Choice	79

LANGUAGES

MS C Compiler	$ Call
MS QuickBasic	Call
MS Quick C	Call
Turbo Basic	59
Turbo C	59
Turbo Prolog	59

SPREADSHEETS

Lotus 123	$ Call
Plan Perfect	165
Quattro	119
Surpass	329

UTILITIES

CopyIIPC	$ 19
Desqview	72
Duet	48
Fastback Plus	87
Formtool	55
Mace	52
Norton Advanced	74
PC Tools Deluxe	39
Sideways Print	39

WORD PROCESSING

MS Word v4.0	Call
Word Perfect 5.0	192
Wordstar ProPack	Call
Wordstar 2000	Call

No Charge for Mastercard or Visa

MasterCard VISA

Call For Items Not Listed

SCSystems
3000 Mariposa Hwy. Ste. B. Nogales, AZ 85621
Order Line 800-669-9933 Espanol 800-842-1777
Status Line 602-275-1395 FAX No. 602-273-0043
Order Line for Europe & Mexico 602-287-5347

TERMS: No charge for Visa or Mastercard We do not charge your card UNTIL WE SHIP your order Manufacturers warranty applies in all cases all warrantias are handled by the manufacturers We accept Purchase Orders from authorized companies only, for 3 5% above cash price No COD orders No refund on opened software All prices are subject to change Allow 14 days for personal/company checks Arizona orders add 6 7% tax

CIRCLE 385 ON READER SERVICE CARD

■ EDITED BY ROBERT L. HUMMEL

LANGUAGES

A simple program to merge C and assembler code listings; creating custom character fonts in BASIC; real-time programming without interrupts in Turbo Pascal.

BASIC

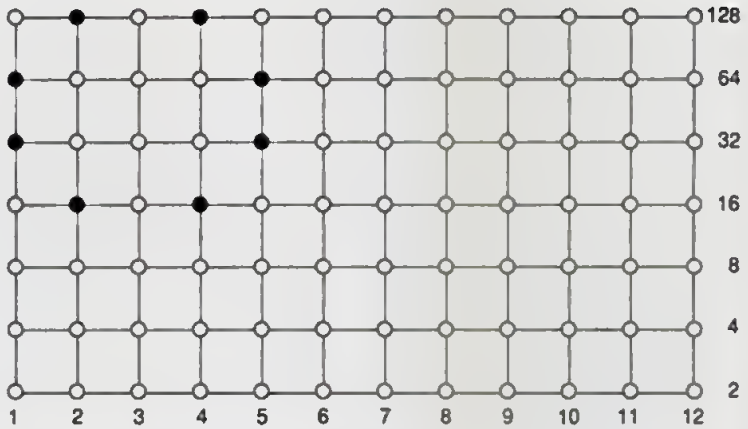
CREATING CUSTOM FONTS

One of the powerful capabilities of the Epson FX series of dot matrix printers is their ability to download and use custom character fonts. These new characters replace those in the existing set. Greek letters or special symbols, for example, may be included in a document.

Custom characters are defined in terms of the printhead pin numbers needed to produce them. The printhead can be visualized by setting up a 12 by 7 grid on a piece of graph paper. The *x*-axis defines the width of the character and is labeled from 1 to 12. On the *y*-axis the scale represents the printer pin numbers in powers of 2 and ranges from 2^1 through 2^7. This is shown in the diagram "Sample Firing Pin Pattern."

When defining your own character set, remember that the same pin cannot be used on two adjacent columns. This would

Sample Pin Firing Pattern



The pin firing pattern for the CHR$(248) degree symbol.

```
10 '    The following program utilizes the DOWNLOAD CHARACTER
20 '    DEFINITION function of the Epson FX-80 printer and
30 '    adds a new character to the print set.
40 '
50 '
60 '    Reset & copy standard ROM CG into Download CG:
70 '
80 LPRINT CHR$(27); "@"; CHR$(0); CHR$(0);
90 LPRINT CHR$(27); ":"; CHR$(0); CHR$(0); CHR$(0);
100 '
110 '   Download info according to page 2-20, 25 of manual:
120 '
130 '   Character 4248 = Degree sign
140 '
150 LPRINT CHR$(27); "&"; CHR$(0); CHR$(248); CHR$(248);
160 LPRINT CHR$(125);
170 LPRINT CHR$(0); CHR$(56); CHR$(144); CHR$(0); CHR$(144); CHR$(56);
180 LPRINT CHR$(0); CHR$(0); CHR$(0); CHR$(0); CHR$(0); CHR$(0);
190 '
200 '   Character 4241 = plus/minus
210 '
220 LPRINT CHR$(27); "&"; CHR$(0); CHR$(241); CHR$(241);
230 LPRINT CHR$(139);
240 LPRINT CHR$(0); CHR$(0); CHR$(24); CHR$(0); CHR$(36); CHR$(0);
250 LPRINT CHR$(250); CHR$(0); CHR$(24); CHR$(0); CHR$(24); CHR$(0);
260 '
270 '   Character 4234 = Lower case Sigma (partial derivative)
280 '
315 LPRINT CHR$(27); "&"; CHR$(0); CHR$(234); CHR$(234);
325 LPRINT CHR$(125);
330 LPRINT CHR$(0); CHR$(0); CHR$(6); CHR$(74); CHR$(144); CHR$(2);
340 LPRINT CHR$(144); CHR$(44); CHR$(40); CHR$(0); CHR$(0); CHR$(0);
350 '
360 '   Character 4232 = Theta
370 '
400 LPRINT CHR$(27); "&"; CHR$(0); CHR$(233); CHR$(233);
410 LPRINT CHR$(125);
425 LPRINT CHR$(0); CHR$(0); CHR$(15); CHR$(48); CHR$(64); CHR$(130);
430 LPRINT CHR$(15); CHR$(128); CHR$(64); CHR$(48); CHR$(15); CHR$(0);
440 '
450 '   Character 4251 = Delta
```

(continues)

Figure 1: *These routines show how to define and download custom characters to an Epson or IBM graphics printer.*

■ LANGUAGES

```
460 '
490 LPRINT CHR$(27)) "&"; CHR$(0); CHR$(251); CHR$(251);
500 LPRINT CHR$(139)
510 LPSINT  CHS$(4); CHR$(0); CHR$(20); CHR$(32); CHR$(68);
520 LPRINT CHR$(128); CHR$(68); CHR$(32)) CHR$(20); CHR$(0)) CHR$(4);CHR$(0)
530 '
540 '   Character $220 = Upper case Sigma
550 '
580 LPRINT CHR$(27); "&"; CHR$(0); CHR$(220); CHR$(220);
590 LPRINT CHR$(139);
600 LPRINT  CHR$(130)) CHR$(68); CHR$(130)) CHR$(40); CHR$(146);CHR$(0);
610 LPRINT  CHR$(130); CHR$(0); CHR$(190); CHR$(0); CHR$(0);CHR$(0);
690 '
700 LPRINT CHR$(0); CHR$(0);
710 LPSINT CHS$(27); "&"; CHR$(1); CHR$(0);
720 END
```

(Figure 1 ends)

cause jamming of the pins and possibly damage the printhead. The BASIC program listing (Figure 1) shows several examples for downloading custom characters using simple LPRINT commands.

Ron McCormick
Tampa, Florida

After running this program, any of the six new characters that have been defined may be printed by using the appropriate CHR$() values. Additional custom letters and symbols may be defined using the techniques that are described by Mr. McCormick—but there is another method to consider.

Most dot matrix printers allow you to send graphics images directly, which can be done on the fly each time the special symbol is needed. For example, type in the following command string on one line:

```
LPRINT CHS$(27) "L" CHR$(8) CHS$(0) "''" STRING$(4, 144) "''"
```

It will print the CHR$(248) degree symbol, but without adding it to the current set of resident characters.

The CHR$(27) "L" sequence initializes double-density graphics, and the CHR$(8) CHR$(0) pair tells the Epson printer that 8 bytes of graphic data are to follow. (Two bytes are sent to accommodate long graphics strings—hence the use of the first number plus 256 times the second number.) The remaining bytes are the graphics data, which in binary represent the degree symbol. The data follows an organization similar to that used for the downloadable characters.

Note that since the printer is in graphics mode, it will print only as many bits as you tell it to. Therefore, you may need to specify a few extra CHR$(0) bytes to maintain the correct spacing between characters. PC Magazine*'s CALC calculator (Utilities, March 29, 1988) will prove invaluable when converting the various binary bit patterns to decimal CHR$() values.*

With patience (and a thorough reading of your printer's owner's manual), these techniques could be applied to any printer that is capable of loading custom fonts or accepting graphics commands.

—Ethan Winer

TURBO C

MERGING C AND ASM LISTINGS

Sometimes the only way to trace a difficult bug in a C program is to study the machine language instructions generated by the

```
/* merge.c
 * DESCRIPTION: merges a 'c' source file with an asm file
 */

#include <stdio.h>

#define LINEBUFFER 200                  /* length of input line */
#define NAMESIZE 80                     /* DOS file/path length */

FILE *p_to_c, *p_to_asm, *p_to_mer;     /* declare file pointers */
char line_buffer[LINEBUFFER];           /* line buffer */
                                        /* file name buffers */
char file_c[NAMESIZE], file_asm[NAMESIZE], file_mer[NAMESIZE];

main(argc,argv)
int argc;
char *argv[];
{
   int line_count, run_count = 0;

   if (argc != 2)
       help_me();                   /* print the usage message */

   strcpy(file_c,argv[1]);          /* setup the .C filename */
   strcat(file_c,".c");

   if(!(p_to_c = fopen(file_c,"r")))       /* open the .C file */
       file_error(file_c);

   strcpy(file_asm,argv[1]);            /* setup the .ASM filename */
   strcat(file_asm,".asm");

   if(!(p_to_asm = fopen(file_asm,"r")))   /* open the .ASM file */
       file_error(file_asm);

   strcpy(file_mer,argv[1]);            /* setup the .MER filename  */
   strcat(file_mer,".mer");

   if(!(p_to_mer = fopen(file_mer,"w")))   /* open the .MER file */
       file_error(file_mer);

                        /* read each line of the .ASM file */
   while (fgets(line_buffer,LINEBUFFER,p_to_asm) )
   {
       if(strncmp(line_buffer,"; Line",6))/* if "; Line" not found */
       {
           fputs(line_buffer,p_to_mer);    /* write it to merge file */
           continue;                   /* get next line */
       }
                                   /* "; Line" was found */
       line_count = atoi( &line_buffer[7] );   /* generate a line count */

       if(run_count < line_count)      /* if backlog in .C file */
           for( ; run_count < line_count) run_count++)
               write_merge_line();     /* write the lines and catch up */
       else
       {
           write_merge_line();         /* write corresponding C line */
           run_count++;
       }
   }
   fclose(p_to_c);                 /* close all files */
   fclose(p_to_asm);
   fclose(p_to_mer);

}

/* write_merge_line()
 *  reads a line from the C source, and writes it out preceded by
 *  a ';'
 */
write_merge_line()
{
   fgets(line_buffer,LINEBUFFER,p_to_c);   /* get .C file line */
   fputs("; ",p_to_mer);                   /* write ';' to merge file */
   fputs(line_buffer,p_to_mer);            /* put .C line after it */
}

/* help_me
 * DESCRIPTION: prints out the title and usage
 */

help_me()
{
   printf("MERGE: a program to merge a 'c' source file and an ASM file\n");
   printf("USAGE: merge filename \n");
   printf("where filename is the name of the files to merge\n");
   printf("Do not type in the period or extension.\n");
   exit(0);
}

/* file_error
 * DESCRIPTION: prints out error message and name of the
 *              file that could not be opened
 */

file_error(name)
char *name;
{
   printf("MERGE: ERROR IN OPENING FILE: %s \n",name);
   exit(0);
}
```

Figure 2: *MERGE.C is a handy little utility that allows C code to be mingled with the compiler's assembly output.*

■ COPY PROTECTION

RUN YOUR PROGRAM ON ANY HARD DISK

UNLOCK Masterkey Removes Copy Protection from 180 PC Programs

The new UNlock MasterKey "copying" disk by TranSec and best selling UNlock Album D+ allow you to quickly and easily make unprotected DOS backup copies of more than 180 popular original PC programs.

Your original disk is unchanged and the unprotected backup copies perform exactly the same as the original, as do copies of these copies.

UNlock copies run on any hard disk, including Bernoulli Boxes. No original key disk is required in Drive A. You can also run on a RAM disk and conveniently copy DOS 5 1/4" programs to 3 1/2" diskettes.

•

Take protection off programs not listed by using generic routines.

•

New UNlock MasterKey is TranSec's most comprehensive copy protection removal program. It unlocks all the programs in TranSec's Albums A+, B+ and D+...and more than an additional 130 programs. It is intended for the user who wants the best and most comprehensive copy-busting program available.

Master Key has the ability to break more than 180 specific menu listed programs. In addition you can take protection off programs not listed in the menus by using generic routines for the PROlock protected programs.

With UNlock MasterKey an analyzer will tell you if the disk is protected by either PROlock or SUPERlock, so that you can simply apply the proper UNlock liberating routine. Even many programs using hardware protection schemes can be unlocked.

While other copiers will make copies of some programs, *only UNlock removes copy protection.* Backups can't require tedious uninstalls, and reorganizing your hard disk doesn't result in your software calling you a thief! To order call 1-800-423-0772.

UNLOCK™ MasterKey™ **$159.95**
Add $5.00 ship/handling Foreign orders $10.00

MasterKey unlocks the programs in Albums "A" Plus and "D" Plus and those below:

Aldergraf (2.2) • **Autocad Etn & Wtn** (2.5x) • **Bancstar** • **Basic-2C Runtime Package** (2.00.04 & 12/12/86) • **Balance of Power '85** • **Cadkey** (2.11.01, 3.01) • **Cadvance** (1.10, 1.20, 1.30) • **Computer Aided Planning (CAP)** 12/15/86 • **Cadvance DXF Translator** • **CAP** (3.00) • **Chessmaster 2000** ('86) • **Courtracting System** (2'2) • **CP2A** (5.8) • **DAM Busters** ('86) • **Data Highway Diagnostics** (1.3) • **Database Manager II** (2.0, 2.02) • **Diagram Master** (5.1) • **Diagraph** (3.3, 3.4.1, 3.5) • **Discovery Litigation Support** (2.3, 2.3e, 3.0) • **Disk Optimizer** (1.4, 1.5) • **Erunacad** (1'10B) • **Escribien** (2, 2.0A) • **Financial Analysis for Farmers** (6.0) • **Financial Profiles** (1.5, 2.2, 2.3) • **Fund Master-TC** (3.5) • **GSS Arab World** (1.36A) • **Harmony** (2.35, 3.00) • **IBM Drawing Assistant** (1.0) • **IBM Graphing Assistant** (1.0, 2.0) • **IBM Planning Assistant** (1.0) • **ICSI Interactive IQ Program** (1.11) • **Insearch** (1.02) • **Insmark** (4.03E) • **Interceptor IV** (1.0A, 1.0B) • **Intercom 102** (2.30S, 4.14) • **Kampfgruppe** ('85) • **Maintenance Analysis System** (4.00) • **Magnatype** (1.4) • **Mapmaster** (6.0) • **Mean 18 Golf** ('86) • **Minitab** (5.1.1) • **Multilingual Scholar** (2.9) • **Multilingual Scribe** (2.9) • **Paradox** (1.0) • **PBS** (1.0) • **PC Emulator** (1.03) • **Petrocalc (85)** • **PCATE** (3.3n-4) • **PC FOCUS** (1.5, 2.0, 4.5) • **PC Information System** (9.21) • **PCLINK** (1.0) • **Pfs:Access** ('84, C) • **Pfs:File** (Tandy B, C) • **Pfs:Graph** (Tandy, B) • **Pfs:Plan** (Tandy, B, C, 2.00) • **Pfs:Report** (Tandy, 1.00, 1.00.00 B, C) • **Pfs:Write** (Tandy, 1.00, 1.01, C, 2.00) • **Picture Perfect** (3.3, 3.5) • **PLC-2 Ladder Logistics** (2/11/87) • **Pluto** ('84) • **Print Master** (1.1P) • **Print Shop** (Early '85, Late '85, '86) • **Pro-Cite** (1.2) • **Quicken** ('84) • **Real CICS** (1.10) • **Real Estate Appraisal System** ('87) • **Redboard** • **Residential Appraisal Processor** (R8C) • **Screenio for Cobol** (2.0) • **Sidekick** (1.56B) • **Sketch Processor** (S5K) • **SmARTWORK** (1.0 r 8-10, 1.1, 1.2 r 3.7) • **Softbol II Runtime System** (2.11) (11) • **Softbridge Financial Planner** (2.1) • **Spectra Business Systems** (3.01) • **Spotlight** (1.0) • **SPSS Statistics for the IBM PC** (1.1) • **Star Trek: The Kobayashi Alternative** • **Superpage** • **Ststat** (2) • **Tango PCB Layout System** (3.03, 3.04) • **Tango Route** (1.10) • **Techsonix Digitizer** (2.6M) • **Taylor Allen Bradley Programmer** (6.19) • **T-Bond Trading System** ('84) • **Tencore Authoring Sustem** (3.00 Beta) • **Tontex** (1.5) • **Type 1 (Broderbund)** ('87) • **Universal Life Pers. Prop. System** (6.4N) • **Varsatile Report System** (2.31) • **Video Store Manager** ('86) • **What's Best** (1.1) • **Westinghouse Numa Logic** (2.1, 3.0) • **GENERIC PROLok Unlocker** • **GENERIC PROLolk Classic** • **GENERIC SUPERLok Unlocker** • **GENERIC HardDisk SUPERLok** • **GENERIC EVERLOCK Unlocker**

"We liked **UNlock MasterKey,** *from TranSec Systems, because it doesn't copy software, it removes copy protection and that's what we want. We also like the speed at which it removed the copy protection and the informative documentatin that accompanied the package.* **Unlock MasterKey** *is simply the most elegant of those we tested and it is well worth its $159.95 price"*

PC MAGAZINE EDITOR'S CHOICE

UNlock MasterKey
EDITOR'S CHOICE
NOVEMBER 24, 1987

THE BEST OF 1987

JANUARY 12, 1988 • PC MAGAZINE

BEST OF 1987 AWARD
UNlock MasterKey

For 1987 *PC Magazine's* authors and editors chose the most significant contributions and most favored products of the year. They called UNlock MasterKey unlocking tools *the ultimate equalizer for removing copy protection.*

PC MAGAZINE

Guaranteed to work only with listed programs:

GAMEMASTER™ $39.95*

Unlocks Over 60 Games Call for Complete Listing

Advanced Flight Trainer '87
Ancient Art of War '87
Californie Games'88
Chassmaster 2000 All
Gauntlet '87
Gunship B.87
3D Helicopter (Sierre) All
Indoor Sports
Karateka
Larry in LLL '87
Mean 18 '86,87
Seerch & Destroy
Test Drive EGA '87
Where in Europe Cermen'88
Where in USA Carmen '87
Where in World Cermen'87

UNLOCK™ $79.95* Album "D" Plus

dBASE II & dBASEIII Plus (1.0)
Framework I & II (1.0)
Clipper (thru winter '85) • Fastback (5.3)
Chartmaster (6.1, 6.2) • Signmaster (5.1)
Dollars & Sense (2.0)
Microsoft Word (1.15, 2.0, 2.01)
Lotus 1-2-3 (1.A, 1A*, 2.0, 2.01)
Symphony (1.1, 1.2)
Lotus 1-2-3 Report Writer (1.0)
DoubleDOS All
Harvard Total Project Mgr (1.10)
Mng Your Money All • Think Tank (2.0, 2.1)
California Games '88 • Rad-Warrior '87
Cadkey (2.11.01) • Cadkey (3.0)
Cadvance (1.10, 1.20, 1.30) • Cadvance (2.01)
CadvanceTranslator (1.20)
Cadvance Database Extracter
Harmony (2.35, 3.00) • Multilingual Scribe (2.9)
Multilingual Scholar (2.9)
SmARTWORK (1.0 r b 10, 1.1, 1.2r3.7)
System Writer '87 • Video Store Manager '86
Westinghouse Numa-Logic (V.2)

*Add $4.00 ship/handling Foreign orders $10.00

CHOICE OF THE CRITICS!

PERSONAL COMPUTING "UNlock has two particularly endearing characteristics. It works, and works simply. I was able to quickly produce unprotected copies ... These copies performed flawlessly, as did copies of these copies." *Christopher O'Malley*

BYTE "UNlock ... It's menu-driven and works fine on the program its supposed to work on: Lotus 1-2-3, dBASE III, Framework, Symphony, Paradox and several others." *Jerry Pournelle*

"Because copy protection can interfere with the ability to back up a hard disk, business oriented users may prefer programs like TranSec's UNlock series." *Winn L. Rosch*

More than 50,000 Copies Sold!

TRANSEC UNLOCK™

ORDER TODAY TOLL FREE:

1-800-423-0772

IN FLORIDA 305-276-1500

VISA MasterCard

UNlock is available for IBM PC, XT, AT and compatibles with at least 256K and DOS 2.1.

All software product names and trademarks are the sole property of their respective owners

■ LANGUAGES

compiler. While Turbo C can generate an assembler listing from a C source file, it can't put the two together in one file. To solve this problem, I wrote a C program, MERGE.C (shown in Figure 2), that creates a single "merged" listing of the original C source code and the compiler's assembler output. The result includes the C code as comments embedded in the assembler source.

To use MERGE, create an assembler listing from your C source code file by using the standalone Turbo C compiler with the -S option. Using the program HELLO.C (see Figure 3) as an example, the command line would be

```
TCC -S HELLO.C
```

This generates the assembler source file, HELLO.ASM. Next, create a merged C and assembler listing, HELLO.MER, as shown in Figure 4, by executing MERGE.

```
MERGE hello
```

Dean Johnson
Oxnard, California

Now, here's a productive use of C! Not only can MERGE aid debugging efforts, but a "merged" listing can be very useful for learning how C is translated into machine language by the compiler.

The limitations of MERGE require that only one .C file at a time be used to generate a merged listing. Since #include references are, of course, only used by the compiler, they will not be listed. Also, since Turbo C will rearrange code for maximum speed or size, the generated assembler may not be in logical order if optimization switches are used.

I took the liberty of modifying MERGE .C slightly to include the globalization of the line buffer, filename buffers, and file pointers (to get them off of the stack); the creation of the write_merge_line() function instead of inline code; and a slight streamlining of the program logic. Micro-

```
#include <stdio.h>
main()
{
        printf("Hello, world\n");
}
```

Figure 3: *The simple "Hello, World" program used to produce a merged listing.*

FINALLY!

EASYFLOW

An on-screen flowchart processor that knows about flowcharts - not just another "screen draw" program that makes you do most of the work. EASYFLOW is a powerful full-screen graphics program dedicated to flowcharts and organization charts. With it you can quickly compose charts. More important, you can easily modify charts so they are always up to date.

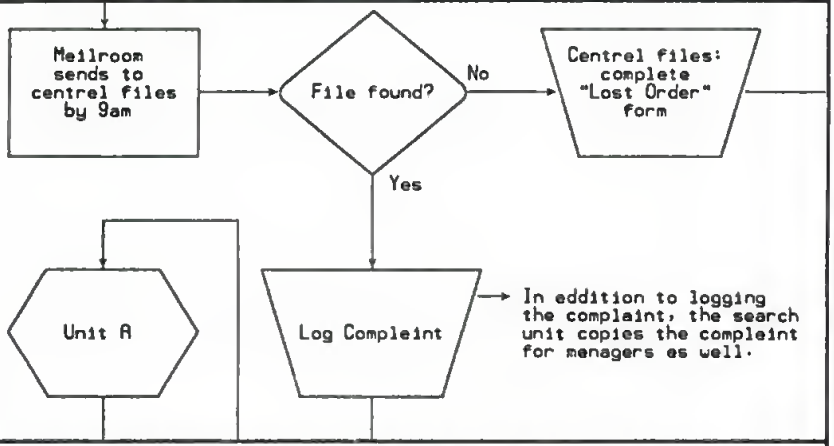
- **Automatic:** Fully automatic text centering within shapes, both horizontally and vertically. Fully automatic line routing & re-routing.
- **Fast:** Written in assembly language for speed.
- **Large:** Charts up to 417 columns wide by 225 lines high. Chart too large for your printer? *EASYFLOW* automatically breaks the chart up & prints it in page size pieces.
- **Standard:** All standard flowcharting shapes included. Custom shapes can be ordered.
- **User friendly:** Don't take our word for it. PC Magazine* says "*EASYFLOW* lives up to its name. It's hard to imagine any easier and more flexible way to produce basic and even complex flowcharts".
- **Mouse:** Optional but fully supported.
- **It prints:** On most popular matrix printers including IBM, Epson, Toshiba, HP LaserJet, LaserJet-Plus and many others.
- **It plots:** On HP7440, 7475, 7550, 7570, 7585B and compatible plotters.
- **It works:** We are contractually prevented from mentioning the name of the "big eight" accounting firm that purchased a world-wide site license, but we can tell you that they spent months evaluating all available flowcharting packages before choosing *EASYFLOW*
- **Rush delivery:** Order by noon today (eastern time) and we'll have it to you by courier tomorrow**. Rush delivery charge is $15.00 (instead of $2.00) and is available only in USA & Canada.
- **Documented:** 100 page manual plus over 150 screens of context sensitive help.

EASYFLOW works on IBM PC's, IBM PS/2 and compatibles. Requires 384 K memory, DOS 2.0 or higher and an IBM CGA/EGA/VGA or Hercules monochrome compatible adapter card.

Order direct for only **$149.95** + $2.00 S&H (USA/Canada), $10.00 (foreign). Payment by M.O., cheque, VISA, Mastercard or Company PO.

* March 10, 1987 issue page 278

** Rush orders are shipped by Purolator Courier and normally arrive the next business day to most locations Remote destinations take longer



The chart fragment above was produced on an HP LaserJet-Plus and is actual size and unretouched. Publication quality charts like this can be produced using only minutes of preparation time and seconds of print time.

CIRCLE 201 ON READER SERVICE CARD

HavenTree Software Limited
PO Box 1093-P
Thousand Island Park, NY 13692

Order Desk: 1-800-267-0668
Information: (613) 544-6035 ext 49
Telefax(G3): (613) 544-9632

```
                name    hello
_text   segment byte public 'code'
dgroup  group   _data,_bss
                assume  cs:_text,ds:dgroup,se:dgroup
_text   ends
_data   segment word public 'data'
_d@             label   byte
_data   ends
_bss            segment word public 'bss'
_b@             label   byte
_bee            ende
_text   segment byte public 'code'
; /*    HELLO.C -- Hello, world */
;
; #include <stdio.h>
;
; main()
; {
_main   proc    near
;       printf("Hello, world\n");
        mov     ax,offset _s@
        push    ax
        call    near ptr _printf
        pop     cx
; }
@1:
        ret
_main   endp
_text   ends
_data   segment word public 'data'
_s@             label   byte
        db      72
        db      101
        db      108
        db      108
        db      111
        db      44
        db      32
        db      119
        db      111
        db      114
        db      108
        db      100
        db      10
        db      0
_data   ends
_text   segment byte public 'code'
        extrn   _printf:near
        public  _main
_text   ends
        end
```

Figure 4: *This merged listing shows the original C code (highlighted) and helps demonstrate what goes on when the HELLO.C program to the left is merged with the compiler's machine language output. Listings of this type can help show what goes on inside a C program.*

"YOU HAVE A TREAT COMING" That's whet *PC Magazine* had to say ebout PC-File+, and now this powerful data-base program is even better: **NEW!** Graphs to help you make your point. Includes: pie, ber, line, scatter, end smoothed average. **NEW!** 8087/80287 math coprocessor support for lightning fest operation. **NEW!** Expanded record end field lengths hold more deta.

With PC-File+ version 2.0 you get these end 26 other edditions to the datebase that is already the favorite of over half-a-million users.

Why do people like PC-File+ so much? It's effordeble *(just $69.95).* Technical support is excellent (just call). And its festures (on-line help, 10 sort levels, lsbeling, snd meil merge, just to neme e few) rivel those of products that cost 5 times as much.

So treat yourself and give PC-File+ a try today. Call **1.800.JBUTTON** for the neme of the dealer nearest you. (In WA: 206.454.0479.)

PC-File+. Just $69.95 for a product that should cost hundreds.

"Affordable, high performance software is possible. All it takes is true commitment to customers."—Jim Button

ButtonWare

ButtonWare, Inc.,
PO Box 5786
Bellevue WA
98006,
206 454 0479

CIRCLE 494 ON READER SERVICE CARD

■ LANGUAGES

soft C users can produce a similar merged listing by compiling with the /Fa and /Fs options.—Richard Hale Shaw

TURBO PASCAL

REAL-TIME CLOCK DISPLAY

The program shown in Figure 5 exploits the fact that many programs spend most of their time waiting for keyboard input. If your program follows this pattern, it is very easy to create a real-time clock display without having to patch the BIOS clock interrupt vectors. Naturally, a program that is heavily bound up in non-keyboard tasks cannot use this technique.

To make use of the program's idle time,

■ It's easy to create a real-time clock display without patching the BIOS clock interrupt vectors.

I created a function called KeyInCoprocess. This function constantly checks for a pressed key. If no key is pressed, it calls the coprocess, in this case the Clock routine. When the user presses a key, the loop ends and KeyInCoprocess returns the key as the function result. Actually, you could call a different coprocess from this routine—for example, print spooling or spreadsheet recalculation. The only limitation is that the coprocess must be liberally sprinkled with "IF KeyPressed THEN EXIT" statements, to prevent long waits at the keyboard. [*The coprocess would also require a method for returning to the exact location and state from which the EXIT occurred.—NJR*]

You now must throw out the normal Pascal Read procedure and instead use a procedure called NewRead. The main difference between the two is that NewRead gets characters from the keyboard using

```
PROGRAM Coprocessor_Clock;
  {$V-,C-}  {NOTE These two compiler switches are ESSENTIAL!}
TYPE
  AnyString = STRING[255];

VAR
  PresentColor,
  PresentBackGround : Byte;       {global variables for colour control}
  Hour, Min, Sec    : Byte;       {global variables for clock control}
  TheString         : AnyString;
  Count             : Byte;       {global variables for main program}

  PROCEDURE SetColor(F, B : Byte);
  BEGIN
    PresentColor := F;            {remember the colour settings}
    PresentBackGround := B;
    TextColor(F);                 {and implement them}
    TextBackground(B);
  END;

  PROCEDURE Clock;                { clock display }
  TYPE
    RegPack = RECORD
                CASE Integer OF
                  1 : (AX, BX, CX, DX, BP, SI, DI, DS, ES, Flags : Integer);
                  2 : (AL, AH, BL, BH, CL, CH, DL, DH : Byte);
              END;
  VAR
    ColumnHold, RowHold, ColorHold, BackGrndHold : Byte;
    Tmp : STRING[2];
    Time : STRING[8];
    Regs : RegPack;

  BEGIN
    WITH Regs DO
      BEGIN                       {get time from msdos}
        AH := $2C;                {call the clock interrupt}
        MsDos(Regs);
        {did the time change ? }
        IF (CH <> Hour) OR (CL <> Min) OR (DH <> Sec) THEN
        {delete the (DH <> Sec) if you don't want seconds display}
          BEGIN
            Hour := CH;           {save the new time}
            Min := CL;
            Sec := DH;            {delete if you dont want seconds display}
            RowHold := WhereY; {save the present cursor position}
            ColumnHold := WhereX;
            ColorHold := PresentColor; {save the present colour}
            BackGrndHold := PresentBackGround;
            Str(Hour:2, Tmp);
            Time := Tmp;
            Str(Min:2, Tmp);
            Time := Time+':'+Tmp;
            Str(Sec:2, Tmp);  {delete if you dont want seconds display}
            Time := Time+':'+Tmp; {delete if you dont want seconds display}
            GoToXY(79, 1);        {go and display the time}
            SetColor(LightCyan, Black);
            Write(Time);
            GoToXY(ColumnHold, RowHold); {restore the cursor position}
            SetColor(ColorHold, BackGrndHold); {and the colour}
          END;
      END;
  END;

  FUNCTION KeyInCoprocess : Char;
    { get characters from the keyboard }
  VAR
    KeyToGet : Char;
  BEGIN                           {if no key pressed then do something else}
    WHILE NOT KeyPressed DO Clock; {it does not have to be just the clock}
    Read(Kbd, KeyToGet);
    KeyInCoprocess := KeyToGet;
  END;

  PROCEDURE NewRead(VAR StringToGet : AnyString);
  {This procedure replaces the 'Read' procedure to read a string.  It would
   require modification if you want to input integers or reals directly.}
  VAR
    CharacterIn, Discard : Char;
  CONST
    Return = ^M;
    BackSpace = ^H;
    Space = ' ';
    Escape = ^[;
    Beep = ^G;

  BEGIN
    StringToGet := '';            {clear the string}
    REPEAT
      CharacterIn := KeyInCoprocess; {get a key if one is ready}
      CASE CharacterIn OF         {check what sort of key}
        ' '..'~' : BEGIN {'Normal' character. - you can select any
                          acceptable range of characters here}
                     Write(CharacterIn); {write it}
                     StringToGet := StringToGet+CharacterIn;
                     {append it to the string}
                   END;
        BackSpace : IF StringToGet[0] > #0 THEN
                      BEGIN
                        StringToGet[0] := Pred(StringToGet[0]);
                        {remove the last character from the string}
                        Write(BackSpace); {backspace on the screen}
                        Write(Space);     {write a blank}
                        Write(BackSpace); {and backspace again}
                      END;
        Escape : BEGIN
                   IF KeyPressed THEN Discard := KeyInCoprocess;
                   {you could implement something with the cursor
                    or function keys here.}
                 END;
        Return : ;    {don't do anything}
      ELSE Write(Beep);       {tells you if you typed something odd}
      END;
    UNTIL (CharacterIn = Return) OR (StringToGet[0] = #255);
    {repeat until return is typed or the string overflows}
  END;

BEGIN                             {main program}
  SetColor(Red, White);
  ClrScr;
  GoToXY(78, 2);  Write('+---+--+');
  FOR Count := 3 TO 9 DO
    BEGIN
      GoToXY(74, Count);  Write('|');
    END;
  GoToXY(28, 18);  Write('Testing Clock Routine ------------------------+');
  GoToXY(28, 15);  Write('Take about a minute to enter this message');
  GoToXY(25, 16);  Write('and watch the clock being updated.');
  GoToXY(1, 12);   SetColor(Black, White);
  Write('+------------------------------ Input a String');
  Write(' ------------------------------+');
  GoToXY(1, 13);  SetColor(Yellow, White);
  NewRead(TheString);
  GoToXY(1, 20);  SetColor(Black, Magenta);
  Writln('+------------------------------ The String Was');
  Write(' ------------------------------+');
  GoToXY(1, 21);     SetColor(Black, White);
  Write(TheString);  GotoXY(1,24);
END.
```

Figure 5: *A real-time clock display that does not modify the clock interrupt. To convert this program, written in Turbo Pascal, Version 3.0, to Version 4.0, use the compiler's UPGRADE.EXE utility with the /3 option.*

Where two worlds become one

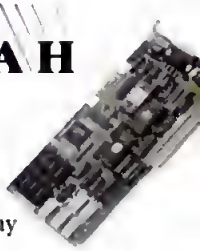
You have the best of both worlds with SigmaVGA/H. One display adapter that gives your PC/XT/AT the power to display any standard software written for the IBM PC or the PS/2.

From the PC World–Everything the Best EGA Board Offers, And More
Start with 100% hardware compatible EGA, CGA, MDA, and Hercules. SigmaVGA/H supports all the standards including digital monitors and 132-column text mode. So you can run all the PC software you own, *including Windows 386*.

From the PS/2 World–Everything That IBM's VGA Offers, And More
Continue with 100% hardware compatibility for VGA. Better yet, run VGA, EGA, CGA, MDA, and Hercules all on the new analog monitor. SigmaVGA/H gives you the power to run all the new PS/2 software, *including OS/2*.

For Your World–One Graphics Board Built on the Experience of 400,000
Sigma Designs introduced the first VGA board, and has sold over 400,000 VGA and EGA adapters to date. We know that informed customers will make the right decision. So get the facts straight from the people who wrote the book, "VGA Issues and Answers." To get your free copy or to find out more about SigmaVGA/H, call us at (415) 770-0100.

SIGMA VGA H

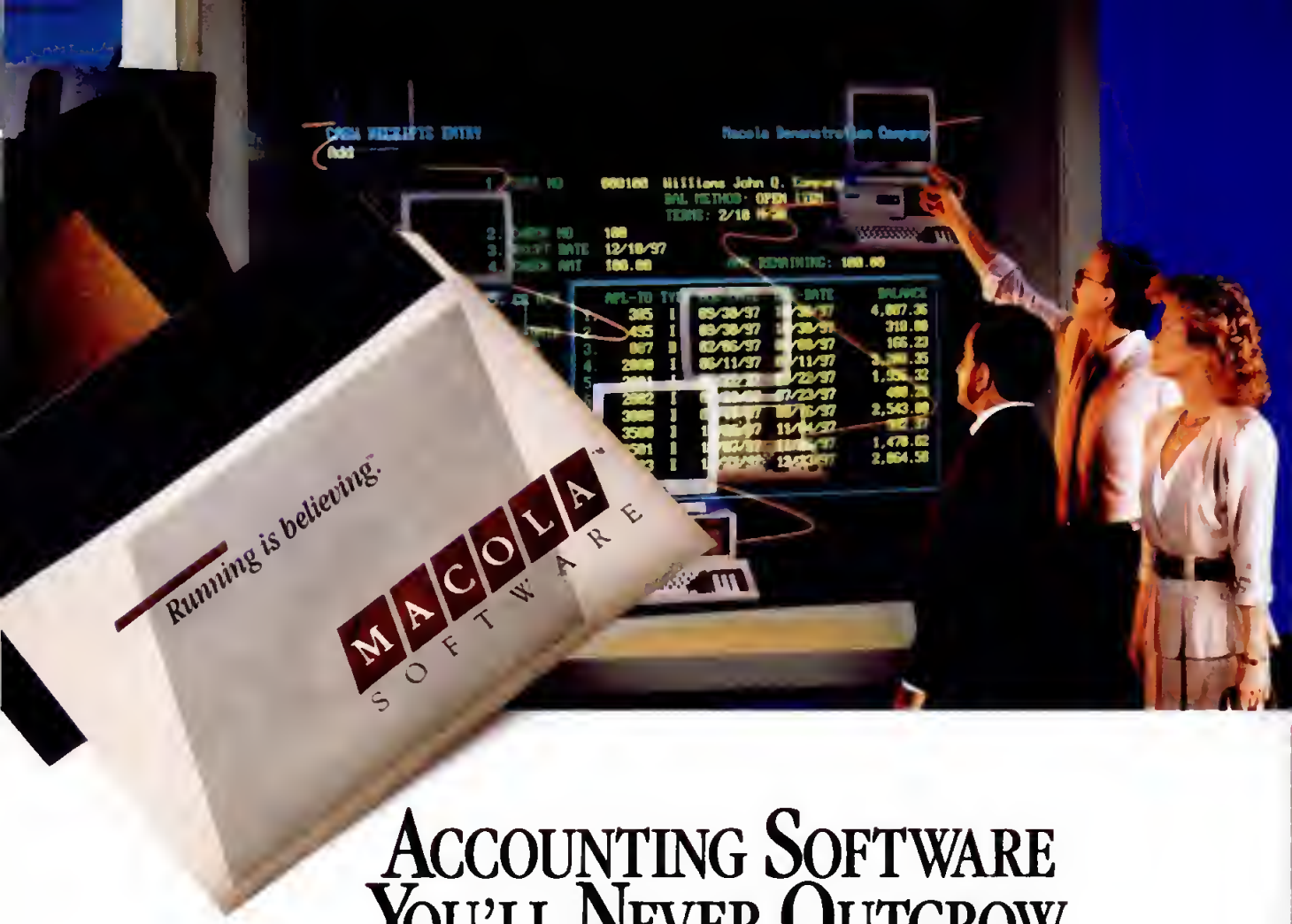


Sigma Designs, Inc.
46501 Landing Parkway
Fremont, CA 94538

S I G M A D E S I G N S

Trademarks: SigmaVGA/H is a trademark of Sigma Designs, Inc.; VGA, EGA, CGA, MDA: International Business Machines Corporation; Hercules: Hercules Computer Technology; Windows 386: Microsoft Corporation

CIRCLE 252 ON READER SERVICE CARD



ACCOUNTING SOFTWARE YOU'LL NEVER OUTGROW.

Business managers now are projecting their accounting software needs well into the future. That's smart. The software you choose must meet the demands of your evolving business and provide management information to help fuel growth.

PC MAGAZINE EDITORS' CHOICE

In the words of PC Magazine, Macola Accounting Software "is at the top of its class...a flexible, powerful system that is well suited to many different businesses."

13 Integrated Modules

Accounting General Ledger—Accounts Receivable—Accounts Payable—Payroll—Assets/Depreciation

Distribution Inventory Management—Customer Order Processing—Purchase Order and Receiving

Manufacturing Bill of Material Processor—Material Requirements Planning—Master Scheduling—Shop Floor Control*—Job Costing*

Plus there's a Report Writer that allows customized reporting and can easily transport data files to popular spread sheet, word processing and data base programs.

Proven Network Compatibility. Macola Software reflects 15 years of maturity in mini and micro LAN environments. No other software can say the same. So when your business is ready to add more workstations, your software is ready as well. With no limitations.

Speed and Data Integrity. Macola Software is written in Micro Focus COBOL for maximum speed and data integrity (source code available.) IBM has licensed Micro Focus COBOL as its SAA standard for the new PS/2 and OS/2.

Comprehensive Support. PC Magazine also determined "Macola's technical support, documentation and customization assistance meet the high standards set by the software."

Running Is Believing. Your choice of Macola Software is a one-time solution for the life of your business. For detailed information, "live" demonstration modules and an authorized reseller in your area, call today:

1-800-468-0834 (USA)
1-800-468-0833 (Ohio)

MACOLA™
SOFTWARE

P.O. Box 485
Marion, OH 43302
(614) 382-5999

Powerful accounting for successful companies.

*Call for availability. IBM, PS/2, OS/2 are registered trademarks of IBM. Micro Focus is a registered trademark of Micro Focus Corp. PC Magazine is a publication of Ziff Davis Communications Co. Macola is a registered trademark of Macola, Inc.

CIRCLE 263 ON READER SERVICE CARD

KeyInCoprocess and then writes the characters to the screen using the Write procedure. Now, whenever your program is gathering information from the keyboard, the clock will tick away in the upper-right corner of the screen. The Clock procedure shown here updates the time every second. If this continual updating drives you scatty, then you can delete a few lines and just display changes every minute.

The sample program in Figure 5 also includes a procedure called SetColor, which I find simplifies the manipulation of screen colors. It is particularly useful here because the Clock procedure has to write in a certain place and color without losing the previous place and color.

Andrew Fiddian-Green
Singapore

There have been a number of real-time clock programs submitted for this column. The coprocessing technique shown here is certainly safer than modifying the clock interrupt. It may be useful in a program such as a word processor, where in fact most of the time the program is waiting for further user input.

One limitation is the requirement that all Reads go through the NewRead procedure. This procedure accepts a single parameter of a string type. In order to simulate reading multiple items or nonstring variables, you will have to read a single string first and then parse it or convert it to another variable type.

Readers familiar with user-defined I/O drivers may wonder why I don't suggest simply replacing the standard ConIn routine with one that calls a coprocess while it's waiting. Unfortunately, calling such a process from within the ConIn routine creates many of the same problems found in the original interrupt-driven clock procedure.—Neil J. Rubenking

SPEAK YOUR LANGUAGE

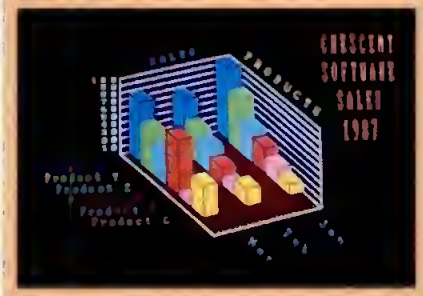
Share your knowledge of BASIC, C, Pascal, FORTRAN, and COBOL with Languages readers, and we'll pay you $50 or more for any tips we print, *plus an extra $25 if you submit your letter on a disk.* If you send a disk, please include a printout. Mail your contributions to Languages, *PC Magazine*, One Park Avenue, New York, NY 10016. PC

BASIC PROGRAMMING TOOLS

Whether you're a seasoned expert or just starting out...

We'll help you create programs that run faster, work harder, and simply look better. All Crescent Software products include source code, demonstration programs, clear documentation, and a 30-day guarantee.

•**QuickPak** More than 65 essential routines for BASIC programmers including windowing, access to DOS and BIOS, searching/sorting string arrays, Lotus™ and pull-down menus, data input, and more. QuickPak is loaded with examples and tutorial information, and comes with *The Assembly Tutor*—an introductory guide to assembly language from a BASIC perspective. $69



New •**QuickPak Professional** The most comprehensive set of tools ever developed for BASIC programmers. Hundreds of assembler and BASIC subroutines including array manipulation, pop-up utilities, multiple windows, mouse support, scientific and financial functions, multi-tasking menus, and more. Includes dozens of examples and complete applications. $149

•**QBase** A superb screen designer *and* full-featured relational database with BASIC source code to allow customizing. QBase provides a complete database, and is outstanding for creating titles, help screens, and product demos. $99

•**QBase Report** Enhances QBase by generating reports with multiple levels of sorting, record updating, and browsing. Report comes with a complete time billing application for computer professionals. $69

•**GraphPak** A complete collection of BASIC subroutines for displaying presentation quality 3D bar, line, and pie graphs from within your programs. Includes sophisticated font and tile editors. (EGA/VGA recommended) $69

New •**GraphPak Professional** All the features of GraphPak plus scientific graphs, 3D surface plots and multiple fonts. Also comes with very fast text-based bar charts. $149

New •**LaserPak** A comprehensive set of subroutines for generating graphics on a LaserJet or compatible. Includes scales, grids, text labeling, Hi-Res pattern editor, and control over all LaserJet commands. $69

New •**QuickMenu** A full-featured DOS menu system for novices and experienced users. Define the menu titles and DOS commands for each choice, and they will be executed automatically. QuickMenu is *not* memory resident, and features context-sensitive help and optional password protection. $49

•**QuickTALK magazine** is our way of saying thank you. The catalog includes feature articles, tips and tricks, and late-breaking news about BASIC. Call or write for your copy. FREE!

CRESCENT SOFTWARE

11 Grandview Avenue, Stamford, CT 06905 (203) 846-2500

Separate versions available for QuickBASIC and Turbo Basic—*please* specify when ordering. Trade-ups are available to professional versions—call for information. Add $3 per order for shipping/$10 overnight—Foreign $10 per item/$35 UPS 2nd day. Visa, M/C, C.O.D. and checks accepted.

CIRCLE 360 ON READER SERVICE CARD

Intelligent Micro Systems

IMS-286/12MHz

Base System $1125

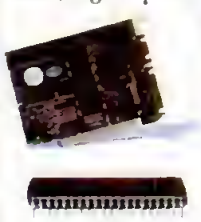
- 80286 processor running at 12MHz, zero wait state, switch-selectable to 6MHz
- 1MB RAM
- 1.2MB diskette drive
- Dual diskette drive/fixed disk controller
- Enhanced, 101-key keyboard
- 200-watt power supply
- Illustrated installation and operations manual
- Clock/calendar with battery backup

Base System with Monographic Card and Monitor	$1255
• With 40MB Seagate (30ms)	$1695
• With 70MB MiniScribe (28ms)	$1995

Upgrade to EGA by adding $320 to monographics system prices!

GREAT BUYS ON AT/XT ADD-ONS

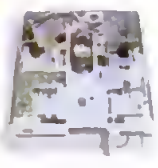
I/O Boards
For AT ®: Serial and parallel ports $59
For PC/XT ®: Serial, parallel, & game ports $65



Math Coprocessors
80287-8 math coprocessor $269
80287-10 math coprocessor $349

1200 Baud Internal Modem
With communications software $69

Diskette Drive
360KB or 1.2MB diskette drive to enhance your system
360KB $99
1.2MB $109



Multifunction Cards
For AT: 0KB expandable to 1.5MB, serial and parallel ports $110
For PC/XT: 384KB; serial, parallel, game ports, clock calendar with battery backup $199

Mice
Logitech Serial Mouse: programmable, three buttons $79
Microsoft Bus Mouse mechanical mouse includes bus interface $119

IMS-286/10MHz

Base System $965

- 80286 processor running at 10MHz, switch-selectable to 6MHz
- 1MB RAM
- 1.2MB diskette drive
- Dual diskette drive/fixed disk controller
- 200-watt power supply
- Enhanced, 101-key keyboard
- Illustrated installation and operations manual
- Clock/calendar with battery backup

Base System with Monographic Card and Monitor	$1095
• With 40MB Seagate (30ms)	$1545
• With 70MB MiniScribe (28ms)	$1835

Upgrade to EGA by adding $320 to monographics system prices!

The Intelligent Solution

IMS-88/10MHz

Base System **$495**

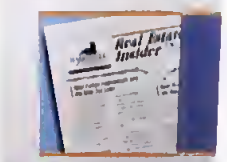
- 8088 processor running at 10MHz, switchable to 4.77MHz
- 640KB RAM
- 360KB diskette drive
- Diskette drive controller
- Keyboard
- 150-watt power supply
- Illustrated installation and operations manual

Base System with Monographic Card and Monitor $625
- With 20MB MiniScribe (65ms) $885
- With 40MB MiniScribe (61ms) $995

Upgrade to EGA by adding $320 to monographics system prices!

★ ★ ★ ★ SOFTWARE SPECIAL ★ ★ ★ ★

First Publisher



EASY-TO-USE Desktop Publishing

PFS: First Publisher by Software Publishing makes desktop publishing affordable and easy to learn. It includes style sheets and more than 60 fonts. **$57**

PFS: First Publisher Art Gallery by Software Publishing adds an extensive collection of popular business, holiday, leisure, and lifestyle symbols. **$75**

T.W.

Shipping time is special for all at Intelligent Micro Systems. With T.W. Armadillo keeping a close eye on the proceedings, all of the outgoing merchandise is carefully loaded on the wagons for distribution around the nation.

"Sort of makes me feel like Santa Claus," T.W. chuckles as he checks off today's list of lucky personal computer buyers who are about to receive their high-performance IMS systems.

T.W. wants to make everyday Christmas for IMS customers — even during the hot Texas summer. That means T.W. offers a wide range of IMS-286 and IMS-88 systems.

Plus T.W. backs it up with the armadillo pledge of service and support. "One year of technical support, one year of coverage under our limited warranty, and 30 stress-free days with our money-back guarantee are part of the deal," says T.W. "Service like that can be rarer to find than a snowflake during a San Antonio heat wave."

INTELLIGENT BUYERS shop for superior products and superior value. All of our products come with a one-year limited warranty, one year of technical phone support, and a 30-day money-back guarantee (not including return freight). We do not charge you for UPS ground shipping within the continental United States, or for buying with your credit card. Intelligent Micro Systems is The Intelligent Choice.
Prices subject to change. Software is non-refundable.
Texas residents please add 8% sales tax.

To Order
Call Toll-Free:
800-777-7757
Mon.-Fri. 8am-9pm CST
Sat. 9am-5pm CST

For Customer Support:
512-250-8794
Mon.-Fri. 8am-7pm CST

CIRCLE 382 ON READER SERVICE CARD

1633 Babcock, Suite 424
San Antonio, Tx. 78229

The computer world is humming about two new Samsung Semiconductor & Telecommunications (SST) brilliant performers — the S500 and S300.

Fully AT compatible, the S500 is the right PC to turn your one-man show into a symphony. Easily switchable from 8 to 10 MHz, the S500 offers 8 expansion slots to support video displays, modems, expanded memory and more. A 1.2 MB 5 1/4" floppy disk drive comes standard and a hard disk can be added for ample memory capacity.

It possesses superb talents such a small package, only 16" by 16".

Fully XT compatible, the S300 runs at 4.77 or 8 MHz and is a powerful, yet economical alternative. It is ideal for use as a stand-alone system or for inclusion as a workstation in a local area network.

Samsung Semiconductor & Telecommunications (SST) supports its already excellent reputation in the computer industry by offering you these excellent products and an attractive warranty program to support them.

S 500

New from Samsung. S500 and S300 that're yours for a song.

S 300

These products are soley distributed through Tech Data Corporation, wholesale distributor in U.S.A. and through CANARA in eastern CANADA, TERRIER in western CANADA.

SAMSUNG
Semiconductor & Telecommunications
CIRCLE 298 ON READER SERVICE CARD

Corporate Headquarters 7th Floor Ankuk Insurance Building 87-1 ka Ulchi-ro, Chung-ku Seoul Korea C.P.O. Box 8233
Telephone (011-822) 771-78 ext 581 - 5 Telex Telecom K24377 Facsimile (011-822) 755-2550
Santa Clara Office 2952 Bunker Hill Lane Santa Clara CA 95054 U.S.A. Telephone (408) 970-8844
New Jersey Office One Executive Drive Fort Lee NJ 07024 U.S.A. Telephone (201) 592-7900 (800) 642-6515-Outside N.J.
L. A. Office: 14251 E. Firestone Blvd. Suite 200 La Mirada CA 90638 Telephone (213) 802-2211
EASTERN CANADA CANARA Technologies Inc. 5560 Kennedy Road Mississauga Ontario L4Z 2A9 Telephone (416) 890-2525
WESTERN CANADA TERRIER Technologies Co., Ltd.. 3700 Gilmore Way Suite 108A Burnaby British Columbia V5G 4M1 Telephone (604) 433-0159

IBM and PC-XT/AT are registered trademarks of International Business Machines Corporation.

■ ROBERT L. HUMMEL

PC TUTOR

Two easy patches that improve REMOVE.COM; the truth about bad sectors on hard disks; the genealogy of the parity flag; and DOS's poor dual-display support.

BAD SECTORS ON HARD DISKS

My department has four brand-new IBM PS/2 Model 50s, each equipped with an IBM 20MB hard disk. CHKDSK shows that all four have a number of bad sectors ranging from 20K to 100K.

My contact at the local ComputerLand (who set up our systems) says that IBM considers a drive "good" even if 10 percent of its sectors are bad. An associate of mine asked his service representative about the problem and was told that as long as the balance of usable bytes on the hard disk was at least 20MB, the customer got what he paid for.

We also have an XT clone in the office. CHKDSK reports no bad sectors on this disk. What problems will we experience with the PS/2s and their bad sectors?

Ernest J. Mascarello
Omaha, Nebraska

A hard disk is really a collection of oxide-coated disks, called platters. All data will eventually be stored on the surfaces of these platters, so the quality and consistency of the oxide coating go a long way toward determining the reliability of the drive as a whole. The coatings are never perfect, however. The platter manufacturing process may produce thin spots, thick spots, or even bubbles.

When the hard disk drive is assembled at the factory, it is put through a rigorous test program. These testing procedures represent the manufacturer's best attempt to ensure that all the recording surfaces will be able to be reliably written and read over the life of the disk. Because of variance in the manufacturing tolerances, some areas of the platter surfaces may fail this testing.

THE BAD TRACK LIST *The areas that fail this test are uniquely located to a single track by specifying their head (surface) number, cylinder number, error size, and distance around the cylinder from an arbitrary index. (These two latter parameters are often termed BL and BCAI, or* bit length *and* bit count after index.*) Unfortunately, if any spot on the track is found bad, the entire track is abandoned.*

All the errors detected in the hard disk are printed out by the manufacturer either on a label that is then affixed to the hard disk or as part of a quality control report that is shipped along with it. Some companies that sell complete computers thoughtfully remove this information, along with manuals and setup disks, before shipping to customers. This is based on their belief that what you don't know won't hurt you. But there is a good reason why the original manufacturer provided this "bad track" information.

■ Some companies that sell computers remove bad sector information. This is based on their belief that what you don't know won't hurt you.

PHYSICAL FORMAT *After a hard disk has been installed in a computer system, the next step in preparing a disk drive is to do a low-level, or physical, format. If you think of a newly manufactured disk as a blank piece of paper, then performing a physical format on the disk is analogous to drawing lines on the paper: it creates a structure capable of holding information.*

Most programs that perform a physical format allow the bad tracks listed on the manufacturer's report to be entered before the format is performed. These tracks are then excluded in their entirety *from the initialization during the physical format. This occurs even if only a single bit on the whole track caused the error.*

If these bad tracks are not "forced," by entering the head and cylinder number, the physical format program will attempt to initialize them. If it detects the error, it will force the track as bad anyway. But often the low-level-formatting program succeeds at initializing a track that the manufacturer marked as bad. This may be because the error was a soft error *that might show up only in the long term. The consequences of this will not be immediately obvious.*

LOGICAL FORMAT *When the physical format is complete, a logical format (also known as a* high-level *format) is performed. The logical formatter normally*

Affordable Networking

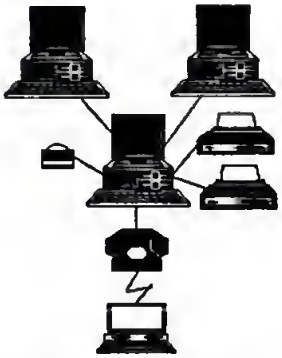
Just $80 per PC

Don't get trapped in a multi-user world. With ExcelINET and your PCs, mainframe *power* is available on a desktop, *without* mainframe *limitations.*

- **Preserves** the single user, stand alone features of the PC, while allowing you to share information via file transfer.
- **Eliminates** costly LAN cables and expensive network interface cards.
- **Frees** you from dedicated servers and network administrators.

Features

- **Networks PCs,** XTs, ATs, PS/2s and compatibles.
- **File Transfer** quickly, accurately and inexpensively.
- **Share printers,** plotters and peripherals.
- **Modem support** for world wide communications.
- **Exchange data** between 3 1/2" and 5 1/4" disks (allows laptops to share resources with desktops).
- **Inexpensive** RS-232 communications.



ExcelINET

The Excellent Network!

Special Introductory Offer
2 PC Starter Kit (includes cables)
Just $180

EXCELLTECH, INC
112 1/2 W. 3rd St.
Yankton, SD 57078
For orders and information call:
(800) 553-TECH (8324)
(605) 665-TECH (8324)

CIRCLE 525 ON READER SERVICE CARD

■ PC TUTOR

used is the DOS FORMAT program. The logical format divides each track into sectors and writes additional information needed for DOS to the disk.

If FORMAT encounters a track that was forced bad by the physical formatter (even because of a single bad bit), it has no options. It must mark the entire track as bad. A standard hard disk is formatted for 512 bytes per sector and 17 sectors per track, so a bad track will cause CHKDSK to report 8,704 bytes in bad sectors.

If FORMAT finds an error on a track that was not marked bad by the low-level formatter, it has a different course of action available. (In any sector that it can't reliably read and write, FORMAT will note as bad and mark only the affected cluster. *(A cluster is the smallest amount of disk storage that can be allocated by DOS.) On a 20MB hard disk, sectors are handled in clusters of four. Thus, the same single bit error will cause CHKDSK to report only four sectors of 512 bytes per sector, or 2,048 bytes in bad sectors.*

Unfortunately, there are some errors that neither the physical formatter nor the DOS FORMAT program have the sophistication to detect. Over the long run some of these errors may crop up and cause loss of data when you least expect it.

A brand new 20MB hard disk that has 100K in bad bytes may seem bad, but if due to forced bad tracks, it boils down to just about 12 bad tracks out of 2,460, or .5 percent of all tracks. If you're optimistic, you can interpret the CHKDSK report as indicating that your dealer took the time to enter in the bad track list. Until you run out of room, you'll be glad your machine has been formatted with the most conservative approach available.

THE 80xx PARITY FLAG

I recently discovered an anomalous result in the setting of the 80286 parity flag. Arithmetic and logical operations can, of course, be performed on either bytes or words, and the processor flags reflect the state of the byte or word result, as appropriate. For example, the sign flag matches bit 7 of the result after a byte operation, but it matches bit 15 of the result after a word operation. The parity flag, however, always reflects the parity of the lower byte of the result only, even after a word operation, which affects the other flags according to the full 16-bit result.

I have tried this on only two processors. Has this behavior been documented anywhere? Is it a bug or was it intended? Does it vary among the '86 family members, or between manufacturers?

Bruce Frostick
Richmond, Virginia

To answer this question, I immediately grabbed my copy of The 8086 Book, *by Russell Rector and George Alexy (Osborne/McGraw-Hill, 1980). It's an indispensable guide for any 80xx assembly language programmer and includes complete information on opcodes, timing, and even program design and documentation.*

Regarding the parity flag, the authors say: "The parity status is set to 1 when the lower-order eight bits of any data operation result has an even number of 1 bits. An odd number of 1 bits causes the parity status to be reset to 0."

The parity flag works the same in Intel's current processors as it did in the 8080, which was a real 8-bit CPU. The operation was kept consistent for the sake of upward compatibility.

SIMULTANEOUS DISPLAYS

In the March 29, 1988, edition of PC Tutor, you indicated that the original IBM PC was designed to support simultaneous operation of two display types: monochrome and color. This is exactly what I would like to do, but I have only been able to effect an either/or switch of the active display adapter with the DOS MODE command.

Is there a DIP switch configuration or some other hardware or software that would allow me to run both monitors truly simultaneously?

Charles Forrest
Champaign, Illinois

The PC BIOS and DOS employ the concept of the active *monitor. Just as disk operations assume the current drive and directory by default, all video activity takes place on the active, or default, display. Just as DOS can't be told to perform all disk operations on drive A:* and *drive B:, it does not provide any support for sending the same output to both monitors simultaneously with a single command.*

THE CORPORATE SOURCE

BOFFIN LIMITED

COMPUTERS

HARDWARE

SOFTWARE

PRINTERS

2500 WEST COUNTY ROAD 42 • #5 • BURNSVILLE, MN 55337 • (612) 894-0595

A Small Case For BIG Performance!!!

TOSHIBA

CALL

T1000
T1200F
T1200H
T3100
T3200
T5100

CALL

ZENITH

SUPERSPORT

Dual Floppy
CALL

20 MB HD
CALL

SUPERSPORT 286/20
CALL

NEC

Multispeed

EL-2
$1495

HD
$2295

Accessories

TOSHIBA	
Carry Case/1000	$ 49
Carry Case/3200	79
Carry Case/5100	79
Modem T1000/1200/3100/5100	329
Modem T1000 1200BPS	329
Modem T1200 Spec	329
Ac Adapter	59
Automobile Pwr. Adpt. for T1000 & T1100	59
17 Key Keypad T1000/1200	99
15 Key Keypad T3100	99
Exp. Chasis	859
Exp. Chasis IF 1100/1200/3100	195
Ext. 5.25 FDD	399
768 KB EMS Mem/T1000	299
2MB Mem Ext/T3100/20	899
3MB Mem Ext/T3200	1399
1MB Mem Ext/T11/12/31/2	599
Ext Bat T1200	75
2MB Mem Ext/T5100	1199
ZENITH	
Carry Case	59
Int Modem 1200 BPS	329
Ext 5.25 FDD	399
Cig Light Adapter	19
NEC	
Carry Case	79
Int Modem 1200 BPS	299
Int Modem 2400 BPS	399
Battery Pac (Nicad)	79
Automobile Adapter	19

Welcome Holmes . . .

External 5.25" FDD

$299

Specify TOSHIBA or ZENITH

INTERNAL MODEMS

TOSHIBA T1100+/1200/3100
1200 BAUD $199 2400 BAUD $269

ZENITH
1200 BAUD $199 2400 BAUD $269

WonUnder

Single card expansion slot for $299
the T1100+, T1200, T3100/20 & T5100

Diconix 150P Portable Printer $319
Laplink Plus $79
When Purchased with any Laptop

Let Our
DAILY ROUTINE
organize yours!

Whether you are involved in selling a product or a service, DAILY ROUTINE can help organize your time and resources. By completing only three simple input screens, DAILY ROUTINE can create

- A Daily Agenda
- Name & Address Files
- Company History Files
- Mailing Labels & Env
- Quotation Reports
- Call & Time Reports
- Expense Reports
- Mileage Reports
- Competitor Reports

DAILY ROUTINE'S Quick Memo feature allows you to write quick, neat and professional memos that can be merged with the Name & Address File.
DAILY ROUTINE is menu-driven and so easy to use that you can put the manual aside after thirty minutes.
DAILY ROUTINE is so friendly your only fear may be that your competitor also has a copy.

DAILY ROUTINE
© Copyright 1987 First Phase
Main Menu
(1) TODAY'S SALES CALLS
(2) TODAY'S AGENDA
(3) EXPENSE & MILEAGE REPORTS
(4) NAME & ADDRESS FILE
(5) COMPANY HISTORY
(6) QUOTATION REPORTS
(7) CALL & TIME REPORTS
(8) QUICK MEMO
(9) COLOR CONFIGURATION SETTINGS
(0) QUIT & RETURN TO DOS
TUESDAY 09/22/87 (F2) CALENDAR 01:30:23 PM

Special $149

- Competitive Price
- Corporate Volume Discounts
- Net Terms to Qualified Corporate Accounts

Prices Subject to Change Without Notice

To Order Call:

FAX Number: 612/894-6175

(800) 255-4012

IN MN: (612) 894-0595

CIRCLE 125 ON READER SERVICE CARD

PC voice mail, now only $199.

Watson®, hailed by one reviewer as "the premier voice mail station" at $498, is an even better value at $199. Watson eliminates telephone tag and gives you big-system features like auto speed-dial, auto answer, message forwarding, and built-in 300/1200 bps modem. For an ear-opening business applications demo, call **1 (800) 6-WATSON** (in Mass., (617) 651-2186). To order, call **1 (800) 533-6120** (in Mass., (617) 655-6066). Credit Cards Accepted.

Watson®

Natural MicroSystems Corporation

CIRCLE 507 ON READER SERVICE CARD

■ PC TUTOR

If you're writing your own program, you can design it to display the same data on each monitor by performing two writes as two separate steps. But the lack of hardware support means that the program would have to assume the responsibility for switching the displays between writes.

If the MODE command isn't meeting your needs, take a look at the DOORS utility published in our February 5, 1985, issue. This program allows dual monitor systems to be switched between color and monochrome displays with a hotkey.

PATCHING REMOVE.COM

I use a lot of utilities from *PC Magazine*. Of these, INSTALL and REMOVE are my favorites for managing TSRs. REMOVE, however, requires that you hit the Enter key to peel off a layer of TSRs. That's great when you're at the DOS prompt, but when you have a menu system, there's no need.

Is there a way to patch REMOVE to avoid the prompt? This would allow readers to load and unload groups of TSRs automatically.

Daniel Murgo
Mendoza, Argentina

I agree. INSTALL, REMOVE, and PCMAP (PC Lab Notes, PC Magazine, *August 1987) are three utilities I use every day to help manage my TSRs. But REMOVE isn't very friendly with batch files and insists on getting its keyboard input live. To help with this problem, I've devised two patches for the program.*

Remember, before you try your hand at patching any program, always make a backup copy in case something goes wrong. You'll also need to have a copy of DEBUG either in the current directory or in a directory in your PATH statement.

The first patch involves replacing the BIOS get-a-key function with the DOS get-a-key function. This allows you to use the DOS redirection facility to feed characters from a file to REMOVE as if they came from the keyboard. First, enter the following commands to patch REMOVE.

```
DEBUG REMOVE.COM
E 204 B4 08 CD 21
W
Q
```

REMOVE will work just like it always has. Run it at the DOS prompt, and it will still ask you to press a key. But if you create a file that contains just the carriage return character and use redirection, REMOVE will execute without any keyboard input.

To create a response file that contains just a carriage return, enter the following commands:

```
COPY CON REMOVE.CR

^Z
```

The first line creates a file called REMOVE.CR and prepares to copy anything you type at the keyboard into it. The second line is blank—just hit the Enter key. The ^Z (Ctrl-Z) on the third line closes the file and is generated by holding the Ctrl key and pressing Z or hitting the F6 key. To run REMOVE automatically in a batch file, use the line

```
REMOVE <REMOVE.CR
```

If you're sure you'll never need to confirm a REMOVE, or you want to create a special batch version (you can rename the file), the following patch will remove all requirements for a response. Start with a fresh copy of REMOVE and type the following commands:

```
DEBUG REMOVE.COM
E 1FC EB 13
W
Q
```

For a batch operation, the list of installed TSRs and confirmation prompt that REMOVE produces can be eliminated by redirecting standard output to the NUL device. To do this, use the command

```
REMOVE > NUL
```

ASK THE PC TUTOR

The PC Tutor solves practical problems and explains points of general interest about using your hardware and software more productively, and answers basic questions about DOS and systems in general. To see your questions answered here, drop a line to PC Tutor, *PC Magazine*, One Park Avenue, New York, NY 10016. We're sorry, but we cannot answer questions personally.

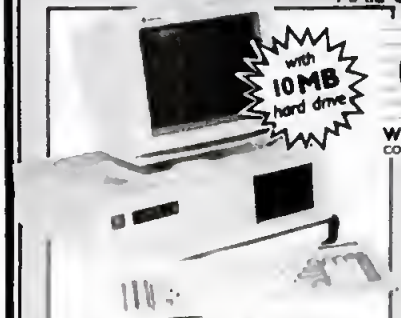
WHOLE EARTH ELECTRONICS

2990 7th Street
Berkeley, California
94710

1-800-323-8080

For CA calls or customer support: **415-653-7758**

MAIL ORDER ONLY

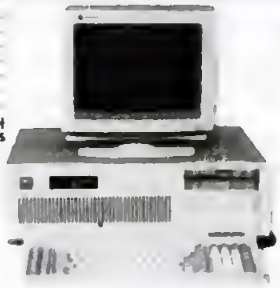


WHOLE EARTH TURBO XT

- Dual clock speed
- 10-MB drive
- 84 key AT keyboard w/LED's
- Hercules compatible graphics card
- Parallel printer port
- Amber TTL monitor w/tilt and swivel
- 256 RAM
- 150 watt power supply
- Fujitsu 360K floppy drive

FREE FREIGHT IN CONTINENTAL U.S. **779.**

20MB XT.....849
30MB XT.....949.



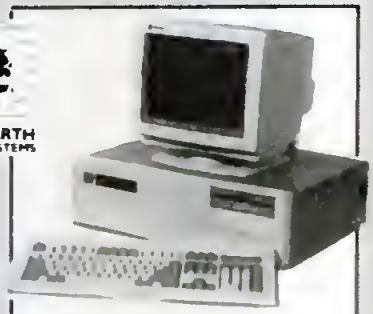
WHOLE EARTH TURBO 286-20

10Mhz COMPLETE SYSTEM

- 1.2 MB Fujitsu drive
- 20MB Hard Drive
- Monographics card
- TTL monitor w/tilt & swivel
- 512K RAM (1MB possible on motherboard)
- Coprocessor socket
- Parallel printer port
- AT style keyboard
- 200W power supply
- 8 expansion slots

FREE FREIGHT IN CONTINENTAL U.S. **1249.**

40MB 286.....1399.
60MB286.....1699.



WHOLE EARTH TURBO 386

16 Mhz COMPLETE SYSTEM
Featuring 32 bit 80386
MYLEX motherboard

- 18.5 Norton ver. 4.0 SI
- Enhanced 101 key keyboard
- 64KB RAM CACHE
- 40MB fast hard drive
- Monochrome graphics w/port
- TTL monitor
- 1MB RAM
- 1.2MB Fujitsu floppy drive

FREE FREIGHT IN CONTINENTAL U.S. **2995.**

70MB 386 ..... 3395.
20Mhz motherboard available

FREE! w/purchase of System and MS-DOS

MenuBlocks

The Intelligent Menu System

AN 89.95 VALUE!

Bridgeway Publishing Corporation

THOUSANDS OF ITEMS AT THE LOWEST POSSIBLE PRICES

Panasonic 108i II	199	Paradise 350	149.
Panasonic 1091i II	229.	Magnavox EGA Monitor	229.
Toshiba P321SL	479	Amber TTL Monitor w/T-S	89.
2400 baud modem	129	Seagate ST 225 w/ Controller	279.
Everex 1200 baud internal	89	Mountain TD4440	299.
Everex 2400 baud external	209	DC2000 MEDIA by MAXELL	19.
Migent Pocket modem	135	Wordperfect 4.2	209.
Toshiba T1000	699	Pagemaker	CALL
Plus Hardcard 20	529	Flight Simulator	22.
CMS Hardcard 20MB	330	First Choice	89
Plus Hardcard 40	799	**CARDS**	
NEC Multisync II	589	Mono/Graphics/Port	59
Toshiba T3100/20	2995	EGA by PARADISE	139.
Zenith Z183/20	1995	RGB Monitor	249
Canon Copiers	LOWEST	Parallel Card	19.
Fuji Diskette DS/DD	79¢	Clock Card	25
Everex 3MB EMS w/OK	79	I/O Plus	59
Everex I/O plus	69	Memory Card w/ OK	40
Paradise 480	169		

About Whole Earth Access

"The Company That Calls You Back"

Whole Earth Access stores, well known throughout California, now sell the finest computer products nationwide. We provide total customer satisfaction at the lowest possible prices. We have 400 employees, we perform over 10,000 customer transactions a week, we do over $70 million business per year! In all, we have the ability and commitment to take care of our customers.

Errors subject to correction.

Whole Earth Computer System

"The Best You Can Buy"

- Technical Support Available
- Built and Tested in the USA
- 1 Year Limited Warranty
- 30 Day Money Back Guarantee
- Licensed MS-DOS 3.3 Available with System Purchases
- Lowest Prices on Thousands of Other Goods
- FCC Approved
- 48 Hour Burn-In

CIRCLE 528 ON READER SERVICE CARD

Now...Exclusively from Northgate

OmniKey/102™ Keyboard

With Function Keys on the left

THE NEW STANDARD IN PC KEYBOARDS

FEATURES YOU'LL LOVE:

1. 12 Function Keys where they belong!
2. Switchable CTRL and CAPS LOCK Keys
3. 13-Key Cursor Control Panel
4. 18-Key Numeric Keypad with separate = Key (the 102nd key)
5. 12 Notepads to pencil in Functions
6. Keys Color Coded to WordPerfect®

The World's Most Advanced Keyboard

NORTHGATE put it all together!

A spectacular new keyboard. It has 12 Programmable Function Keys AND THEY'RE ON THE LEFT. Where they belong!

Now, typing speed and productivity return. No more hunting for function keys. They're where your fingers expect. And your standard templates fit. We've even color-coded keys for WordPerfect users.

Other features galore!

You can switch the CTRL and CAPS LOCK keys so CTRL is where typists expect it to be. We supply the key-caps at no extra cost.

Typists love it. Increases in speed and accuracy of up to 30% are reported. It's the touch, the feel and the layout the computer industry has been begging for and it's available now.

► *Use OmniKey/102 10 days Return for FULL REFUND if not 100% Satisfied! Unlimited 3-Year Warranty*

Compatible with most XT, AT and 386 type systems using standard circular DIN connector. If uncertain, contact your computer supplier for connector type.

LIMITED INTRODUCTORY PRICE

$89.00

FOR IBM PS SERIES MODELS ADD $25.00

Northgate designed it. Northgate makes it. Exclusively. Others will copy it, but they won't match the Click/Tactile touch and the solid "sit down to stay on your desk" feel of OmniKey/102.

***Order yours now!* Initial supply may be limited. And prices are subject to increase with world component supply costs. Best of all—use it for 10 days and return it for full refund if it's not everything Northgate claims!**

MasterCard VISA

ORDER NOW TOLL FREE

800-453-1400

Phones answered 24 hours or mail your order ►

Phone Corporate Offices for Dealer and Quantity Prices
612-553-0111 / FAX 612-553-1695

NORTHGATE COMPUTER SYSTEMS

13895 Industrial Park Blvd., Suite 110
Plymouth, Minnesota 55441

What the Pro's Say...

Gary Ray in *PC Week*, May 17, 1988

"REVOLUTIONARY AND MUCH NEEDED..."

"Better than any replacement keyboard ever used by this editor, it is also a viable alternative to IBM's own model... places the 12 Function Keys where God intended them to be vertically along the left side of the keyboard. Other intelligent features make the OmniKey an outstanding buy, but the major facts are these. It's durable, well-designed, sensible and has just the right feel. Best of all, it's relatively inexpensive."

Steve Gibson in *InfoWorld*, February 8, 1988

"FINDING THE IDEAL KEYBOARD..."

"Imagine my surprise and delight when I found myself facing my dream keyboard... If you want the best keyboard I've ever laid my hands on, check out Northgate's..."

Andrew M. Fried in *Computer Shopper*, June, 1988

"THE MOST COMFORTABLE KEYBOARD..."

"Once again, I would like to say that the Northgate OmniKey 102 Keyboard is probably the most comfortable keyboard... features good tactile response, they're laid out well, are attractive, and very pleasant to use."

Northgate Computer Systems
13895 Industrial Park Blvd., Suite 110
Plymouth, Minnesota 55441

Ship:
_____ (Quantity) OmniKey/102 @ $89.00
_____ (Quantity) "C/T" 101 @ $99.00
_____ (Quantity) "C/T" 84 @ $79.00
_____ For IBM PS Models add $25.00

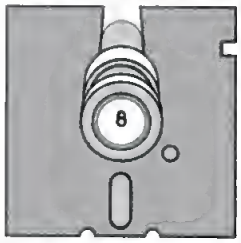
Name _____
Company _____
Address _____
City _____ State _____ Zip _____
Phone _____ Type of Computer _____
Visa/MC # _____ / _____ / _____ / _____
Expiration Date _____
Signature _____

Note: Order processing takes 3-4 days. We ship UPS. For ground shipping add $7.00 ea. allowing 2-3 weeks for delivery. For second day after processing time, add $12.00 ea. For overnight, after processing time, add $22.00 ea.

OmniKey/102™ is a trademark of Northgate Computer Systems. IBM XT and AT are registered trademarks of IBM Corp. WordPerfect is a trademark of WordPerfect Corp. Copyright 1988 Northgate Computer Systems

■ FRANK J. DERFLER, JR.

CONNECTIVITY CLINIC



Finding ARCnet's station address with BASIC; reading Ethernet's node identifications using C; terminating printer spooling in commercial programs automatically.

STOPPING PRINTER SPOOLING

Using 3Com's *3+Share* to release print files works nicely for programs written in-house ("LAN Printing Tip," Connectivity Clinic, February 29, 1988). Here is a way to terminate printer spooling in commercial programs.

If the program lets you set up the printer output device, print the output to a file called LPT1. Leaving off the colon tricks *3+Share* into thinking it is receiving a file, so it prints it immediately. But DOS still recognizes it as a device name, so the output goes to the printer linked to that device name.

This trick works with many popular programs. In *WordPerfect*, when you set up your printers (Shift-F7,4,3), choose 8 for Printer Port and enter LPT1 as Device or File Pathname. *Lotus 1-2-3* will not allow you to set up a filename as the global default, but when you are ready to print, type /PF (Slash Print File) instead of /PP (Slash Print Printer) and enter LPT1 (you first may need to press Esc once to clear the pathname from the command line).

Some of the more-advanced database languages, such as *DataFlex* by Data Access Corp., have a DeSpool command that may be embedded at the end of print routines, allowing automatic despooling of print files.

Robert Stockton
Surf City, New Jersey

Since DOS accepts device names with or without the semicolon, this trick is a slick way to slide a file through the print spool.

NODE ID WITH ETHERNET AND C

The program ENADR.C in Figure 1 extracts and prints the Ethernet network address for a 3Com 3C501 EtherLink card.

We use the output of this program as the input to another program that creates a DBMS key based on the Ethernet address. This key is guaranteed to be unique, since no other Ethernet card on the planet (regardless of the card's manufacturer) contains the same Ethernet address.

Dan Lasley
Cordova, Tennessee

```
#include "stdio.h"

#define L_GETEAR 6                          /* bytes in binary E/N address */
#define L_EA     (2 * (L_GETEAR + 1))       /* size of ASCII E/N address */
#define IE_GP    8                          /* xmit, station addr PROM pointer */
#define IE_SA    12                         /* station address PROM window */
#define EA_BASE  0x300                      /* Ethernet adapter base address */

main()
{
  int i, byte, base = EA_BASE;              /* 3C501 adapter I/O base address */

  for (i=0; i<L_GETEAR; i++) {
     outport (base + IE_GP, i);             /* point to E/N address byte */
     byte = inportb (base + IE_SA);         /* fetch address byte */
     printf ("%02x", byte & 0xff);
     }
  printf ("\n");
}
```

Figure 1: *ENADR.C extracts and prints the Ethernet network address.*

■ CONNECTIVITY CLINIC

We see here how to use C to get the same information from Ethernet cards that we will obtain in the next letter by using a BASIC programming exercise.

You don't have to force a reset on Ethernet cards to read their node IDs the way you do with ARCnet cards.

This program uses the C functions `outport` *(output a word to a port) and* `inportb` *(input a byte from a port).*

GETTING ARCNET'S NUMBER

We use an ARCnet network that runs under Novell's *NetWare*. Is there any way to determine the ARCnet station address from within a BASIC program?

Roy Goldberg
New York, New York

For the benefit of readers unfamiliar with ARCnet, let me explain that every ARCnet card is assigned a number from 1 to 255 (usually through DIP switches) when it's installed. However, no two cards can have the same number. To avoid assigning duplicate numbers when you're installing new cards, you must know the number of each card already on the network. If you don't have a record of the number assigned to each card, your only alternative is to take the cover off each machine and examine the DIP switches.

If you do have a record of the numbers assigned to the adapters, you will find them useful for configuring the parameters of programs as they start to run on each machine. The permanent numbers assigned to Ethernet and Token-Ring network interface adapter cards are often used for this purpose. When a program finds the number of the adapter card, it refers to a table and brings in the right video, keyboard, and other enhancement routines for that machine. In this case, we want a BASIC program to determine the identity of each machine so that we can customize other operations for the particular machine on which they are running.

■ Every ARCnet card is assigned a number when it's installed; no two have the same number.

We consulted with Standard Microsystems Corp., which said there is a relatively simple BASIC program that does what we want, but there's a catch. When you interrogate the card for this information, the act knocks the card off the network. This will force you to reinitialize NetWare *(by*

HYUNDAI'S NEW OFF-ROAD VEHICLE.

It uses no gas. And will drive you wild with delight. It's the new Hyundai Super-16T. A fast, powerful, affordable XT-compatible built to go the distance.

It comes fully-equipped. And even includes easy-to-use word processing, spreadsheet, database, spellchecker and communications software. What's more, it's backed by an 18-month warranty. But, best of all, Hyundai's new off-road vehicle is dirt cheap. Just $999*

Test drive the Super-16T or one of Hyundai's other exciting off-road vehicles today. For the Hyundai dealer nearest you, call 1-800-544-7808 ext. 121.

HYUNDAI

*Suggested retail price/single floppy disk drive model. © 1988 Hyundai Electronics America. XT is a trademark of IBM.

CIRCLE 124 ON READER SERVICE CARD

PROTECT YOUR COPIES OF PC MAGAZINE

Make your collection of *PC Magazine* a handsome addition to your office or home—*and protect and organize your copies for easy reference!*

PC Magazine Binders and Cases are made of durable, luxury-look leatherette over quality binder board. Custom designed for *PC Magazine*, every order receives FREE transfer foil to mark dates and volume numbers.

FOR FAST SERVICE CALL TOLL-FREE 1-800-972-5858

MAGAZINE BINDERS
Hold your issues on individual snap-on rods. $9.95 each; 3 for $27.95; 6 for $52.95.

OPEN BACK CASES
Store your copies for individual reference. $7.95 each; 3 for $21.95; 6 for $39.95.

PC MAGAZINE
c/o Jesse Jones Industries
499 E. Erie Avenue · Philadelphia, PA 19134

Please send ☐ Binders ☐ Cases Quantity _____

Payment enclosed $_____.* Add $1 per case/binder for postage & handling. (Outside USA, add $2.50 per case/binder ordered, US currency only.)

Charge my:
☐ Amex ☐ Visa ☐ MC (Minimum order $15)

Card No._____ Exp. Date_____

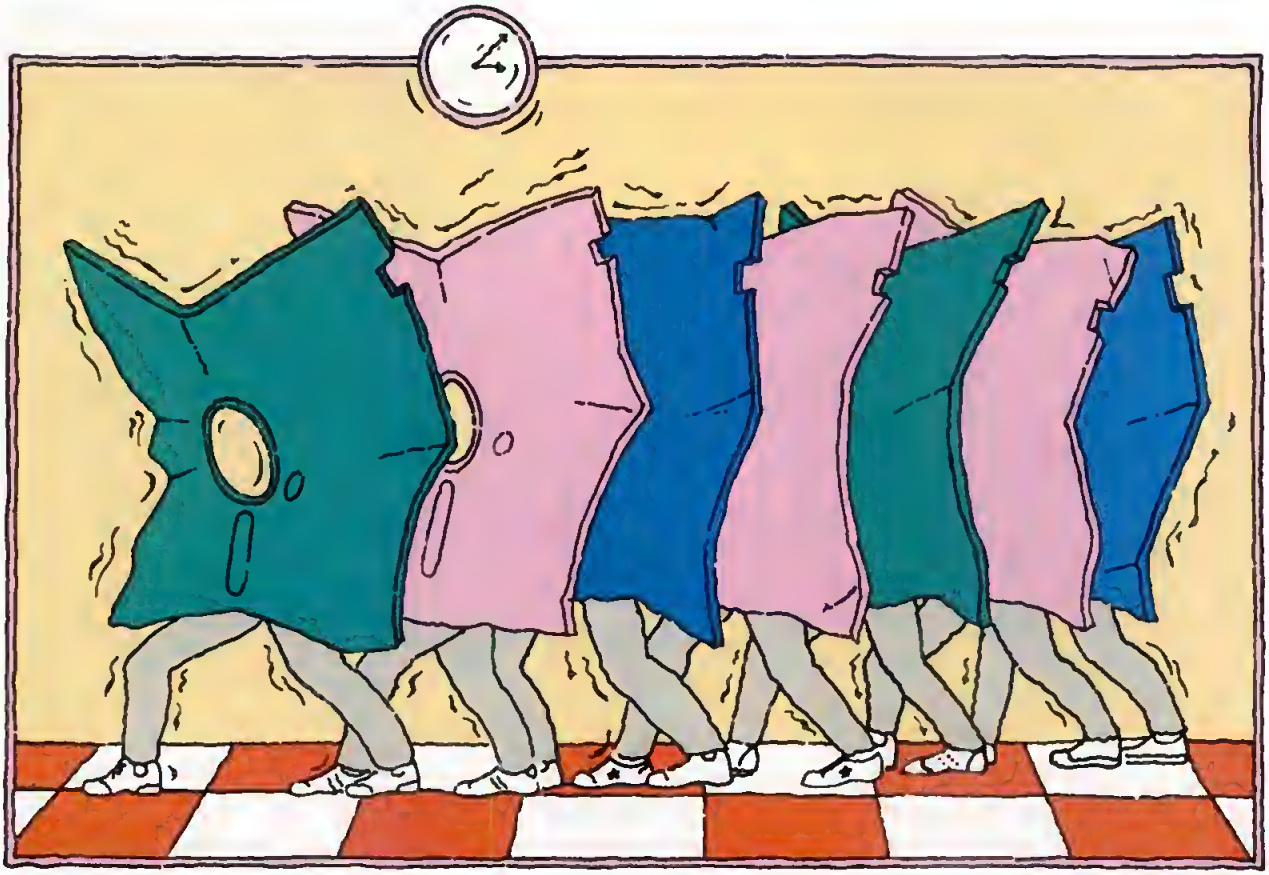
Mr./Mrs./Ms._____
Please Print Full Name

Address_____
No P.O. Numbers Please

City_____

State_____ Zip_____

*PA residents add 6% sales tax.



Tired of Walking Floppies?

Get rid of your tennis shoe network with ManyLink.

You need to share a document, so you walk a floppy to an associate. Or you need something printed, so you walk a floppy to someone who has a printer on their PC. Which means they have to stop what they're doing. Maybe you have a message for someone. Or just want to chat. More walking. More interruptions. More bother.

Stop walking, start sharing.

You can stop walking floppies around and start sharing documents, printers and messages—all three features—from one software package: ManyLink for PCs. It even allows you to do 5.25" and 3.5" disk conversions between PCs and PS/2s.

No other PC network is so versatile or so easy to install and run. Or so economical. You can connect two PCs with ManyLink for only $165.

Share files while you work.

It's simple. With a couple of keystrokes you can request a disk file from another ManyLink connected PC, then go back to your work. File transfer is accomplished "in the background"—without interrupting you or the other PC. A polite beep on your computer tells you when the file arrives. Files you don't want to share can be locked to protect data from network access.

Share printers without leaving your desk.

Send your jobs to any printer connected to a PC running ManyLink. While your job is being printed, you can continue your work because all printing—like file transfering—occurs unnoticed in the background.

Chat with another PC user.

You can send and receive brief messages to another ManyLink connected PC without leaving your application. Telephone messages, instructions, questions or whatever...appear on your screen.

Costs that won't run away from you.

ManyLink for PCs fills your networking needs now and can grow easily and inexpensively as you expand. Each $165 ManyLink for PC package contains all you need to make two PCs communicate: a 25' serial cable, instruction manual and software. Each additional package allows you to connect another PC, and so on. Add PCs as you want, when you want.

Take a walk (or run) to your dealer now for ManyLink for PCs. Or contact NetLine, 85 West Center, Provo, Utah 84603. Telephone: (801) 373-6000.

NetLine™

CIRCLE 147 ON READER SERVICE CARD

Conquer the Connectivity Challenge

The Challenge
If you're of the opinion that networking lots of PCs, printers, modems and host computers together has to be complicated and expensive, we'd like to change your opinion.

Presenting SwitchLAN
SwitchLAN is a simple low-cost network. It provides "hot-key" File Transfer, Terminal Emulation and Printer Sharing at a cost of about $150 per PC.

Easy Does It
Installing SwitchLAN is a snap. It uses telephone type twisted-pair wiring and the serial COM port already in your PCs. You don't need to buy expensive network servers, install network boards in every PC, or struggle with coax cable.

Using SwitchLAN is as easy as installing it. Extensive help and pull-down menus are provided so people don't have to be network gurus to use it.

Challenge Us
Don't take our word for it. Call for more information or a free demo disk. With SwitchLAN you can turn a Connectivity Challenge into Child's Play.

Call 1-800-328-2729
In Florida: 305-255-3500
Equinox Systems Inc.
14260 S.W. 119 Avenue
Miami, FL. 33186

EQUINOX
Simply Better Networks

CIRCLE 170 ON READER SERVICE CARD

■ CONNECTIVITY CLINIC

running Anet3 or IPX plus Net3).

The listing for this program is

```
ARCNET CARD NODE ID

 10  CLS:KEY OFF
 20  DEF SEG= &HD000
 30  OUT &H2E8, 0 :REM FORCES A RESET
 40  FOR I=1 to 1000
 50  J = I
 60  NEXT I
 70  J = PEEK(0) :REM CHECK RAM BUFFER
 80  IF J<>&HD1 THEN 40 :REM LOOK AGAIN
 90  K=PEEK(1) :REM READING NODE ID
100 PRINT "THE ARCnet NODE ADDRESS OF"
110 PRINT "THIS STATION IS ",K
120 END
```

You can download this program from PC MagNet (see the sidebar "SETMODE by Modem" in this issue's Utilities column).

No matter what application you have in mind, I suggest that after the program finds the identification number, you write that number to a file that can be read by subsequent programs. If this isn't acceptable, individual users can run Novell's UserList program to display the identity of active nodes. In the BASIC program shown, you must set the value in line 20 to the hex address of the RAM buffer. &HD000 is the typical value, but try &HC000, &HCC00, &HDC00, or &HE000 if that doesn't work.

You set the ARCnet board's base I/O hex address, plus 8 bits, in line 30. The typical hex values of &H2E0 and &H300 become &H2E8 and &H308.

The OUT command in line 30 forces a reset of the ARCnet card. This reset forces the card to transmit its node ID number, but it also drops the card from the network.

The loop and PEEK in line 70 is a routine that looks for D1, the reset complete indicator, in the RAM buffer. If that indicator is present, line 90 reads the node ID in the second byte.

NETWORK YOUR QUESTIONS

Connectivity Clinic gives you practical solutions to networking problems of all types. We'll pay $50 or more for any tips we print, *plus an extra $25 if you submit your letter on a disk*, and we'll gladly answer any questions you have, at no charge. We're sorry, but we're unable to answer letters personally.

Mail your contributions to Connectivity Clinic, *PC Magazine*, One Park Avenue, New York, NY 10016, or you may contact Frank J. Derfler, Jr., via MCI Mail (be sure to use Derfler's box named CONNECTIVITY CLINIC). PC

The Hard Drive Specialists.

"Lifetime Memory Products looks like one of the better mail-order sources for fixed disks. You not only get good hardware, you also get your money's worth in terms of warranty, technical support, and good treatment from the sales staff."
- Walt Rowinsky, PC Magazine Dec. 8, 1987

FOR YOUR AT® OR COMPATIBLE

Introducing the Seagate ST251-1: 40 megabytes and 30ms access time at an incredible price. Features half-height, 5.25-inch size.

The Kit Includes:
- Seagate Model ST251-1 hard drive
- Installation manual
- Cable
- Lifetime Backup Utilities and manual

40MB Seagate, 28ms.....$459

FOR YOUR PC/XT® OR COMPATIBLE

The new MiniScribe® 3650: 40 megabytes of fast-access (61ms) storage space at a fraction of the cost of two 20MB drives.

The Kit Includes:
- MiniScribe Model 3650 hard drive
- Installation manual
- Hard drive controller and cables
- Lifetime Backup Utilities and manual

40MB MiniScribe, 61ms $399

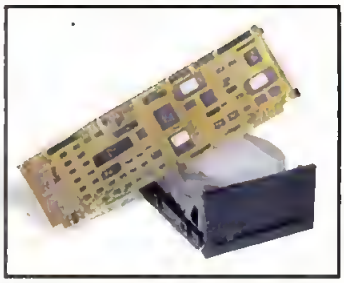
AT DRIVES: Our AT drives come with data cable, mounting slides and manual for quick installation.

20MB Seagate, 65ms.....$249
40MB Seagate, 30ms.....$459
43MB MiniScribe, 25ms $569
71MB MiniScribe, 28ms.....$749

PC KITS: Our kits come complete with a hard drive, controller card, mounting hardware, cables, and illustrated manual.

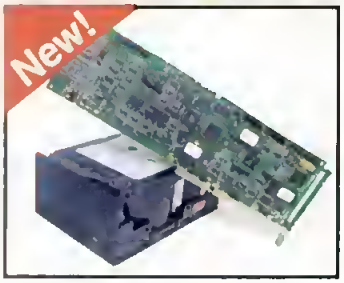
20MB MiniScribe, 65ms $279
20MB Seagate, 65ms.....$279
40MB MiniScribe, 61ms $399

Premium Performance
For Your AT or Compatible



MiniScribe 110MB Full Height:
- 28ms access time RLL-certified Model 6128 hard drive
- 7.5Mbit per/sec RLL dual hard drive/floppy controller
- 1:1 interleave controller **$1189**

CDC 150MB Full Height:
- 18ms access time ESDI-certified hard drive
- 10Mbit per/sec ESDI dual hard drive/floppy controller
- 1:1 interleave controller **$1649**



Maxtor 338MB Full Height
- 16ms access time ESDI-certified hard drive
- 10Mbit per/sec ESDI dual hard drive/floppy controller
- 1:1 interleave controller $2895

48-HOUR BURN-IN TEST

48-Hour Burn-In Test On All Hard Drives

FREE WITH EVERY HARD DRIVE

Lifetime Backup Utilities — Backs up, compares, and restores your files. Easy to use, reliable, and fast!

Sixty-Day Money-Back Guarantee

NO CHARGE FOR UPS GROUND SHIPPING

Free UPS ground shipping within the continental USA. Texas residents add 8% sales tax. Sixty-day, money-back guarantee does not include freight. Prices are subject to change without notice.

National Sales:

800-622-8001

In Texas: 1-800-288-4445

Monday - Friday: 8am - 9pm CST
Saturday: 9am - 5pm CST

Customer Service: 1-512-335-7598
Monday - Friday: 8am - 7pm CST

LIFETIME MEMORY PRODUCTS

Lifetime Memory Products
12611 Research Blvd. #400
Austin, Texas 78759

CIRCLE 341 ON READER SERVICE CARD

FOR A COMPUTER SYSTEM THAT C
LOOK TO FIVESTAR WHERE THE F

FIVESTAR computers will consistently out-perform your most demanding expectations, providing solutions for all your computing needs. When you boot up your FIVESTAR system, you'll discover performance-orientation and advanced capabilities that offer a price/value relationship unmatched in the industry.

SOLUTIONS BUILT ON QUALITY AND SERVICE.

FIVESTAR has built one of the most advanced facilities in the U.S., staffed with highly skilled technicians and R&D specialists. Every system is fully tested and certified with a 48-hour burn-in before shipment. FIVESTAR's team of knowledgeable direct marketing consultants will help you select the best system for your business needs. And once you've made your purchase, FIVESTAR's toll-free 800 service number will provide quick and easy access to any support you may need. You can count on FIVESTAR to solve most problems in a matter of minutes over the telephone.

STANDARD ZERO DEFECT OF EXCELLENCE

FREE ON-SITE SERVICE, AND MORE.

ONE YEAR ON-SITE SERVICE GUARANTEE

Every FIVESTAR computer system (CPU, disk drives, monitor and keyboard) comes with a FREE annual on-site service contract that completely covers all parts and labor. Most on-site service calls are made in less than 24 hours; and, together with the FIVESTAR Warranty, you receive the most comprehensive service policy available on the market today.

INTRODUCING FIVESTAR LEASING.

FIVESTAR leasing offers 100% financing on any system purchased. You will benefit from having a low monthly fixed payment, while enjoying the full use of your leased equipment. You also have the flexibility of upgrading your system, without penalty, at any point during the lease term.

IT ALL ADDS UP TO THE FIVESTAR ADVANTAGE.

When you buy from FIVESTAR, you buy with the confidence that you're paying for quality technology and manufacturing. From a powerful single system to a multi-user environment, FIVESTAR offers the ability to perform with spectacular success through even the most intensive multi-tasking and networking applications.

Call FIVESTAR Computers today and put the FIVESTAR advantage to work for you.

FIVESTAR XL/10

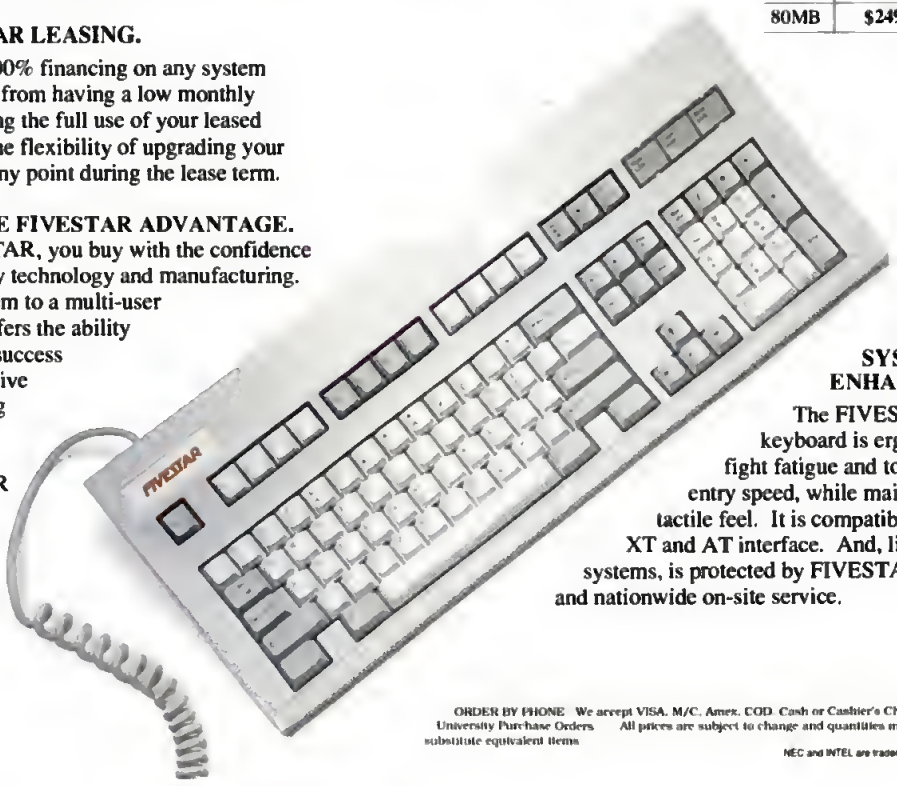
- NEC™ V20 CPU
  Operating at 4.77 or 10MHz
- 640KB MEMORY
- 4.1MHz THROUGHPUT
- 360KB FLOPPY DRIVE
- REAL-TIME CLOCK/CALENDAR
- SERIAL/PARALLEL/GAME PORTS
- EIGHT EXPANSION SLOTS
- ENHANCED 101 KEY KEYBOARD
- ONE YEAR ON-SITE SERVICE

HARD DRIVE	12" MONO COMBO	14" COLOR COMBO	14" EGA COMBO
20MB	$1295	$1495	$1695
40MB	$1495	$1695	$1895

FIVESTAR 286/10

- INTEL™ 80286 CPU
  Operating at 6 or 10MHz
  with zero wait states
- 640KB MEMORY
- 13.3MHz THROUGHPUT
- 1.2MB FLOPPY DRIVE
- REAL-TIME CLOCK/CALENDAR
- SERIAL/PARALLEL/GAME PORTS
- EIGHT EXPANSION SLOTS
- 200WT POWER SUPPLY
- ENHANCED 101 KEY KEYBOARD
- ONE YEAR ON-SITE SERVICE

HARD DRIVE	12" MONO COMBO	14" EGA COMBO	14" VGA COMBO
20MB	$1795	$2195	$2495
40MB	$1995	$2395	$2695
80MB	$2495	$2895	$3195



EVERY FIVESTAR SYSTEM INCLUDES AN ENHANCED 101 KEYBOARD.

The FIVESTAR enhanced 101 keyboard is ergonomically designed to fight fatigue and to support continued data entry speed, while maintaining a consistent tactile feel. It is compatible with any standard PC, XT and AT interface. And, like all FIVESTAR systems, is protected by FIVESTAR's one year warranty and nationwide on-site service.

ORDER BY PHONE We accept VISA, M/C, Amex, COD, Cash or Cashier's Check and approved Corporate and University Purchase Orders. All prices are subject to change and quantities may be limited. We reserve the right to substitute equivalent items.

NEC and INTEL are trademarks of their respective companies

AN CARRY YOU INTO TOMORROW
UTURE IS TODAY.

FIVESTAR 386/20

- INTEL 80386 CPU
  Operating at 6 or 20MHz
  with zero wait states
- 1MB 32-BIT MEMORY
- 64KB CACHE MEMORY
- 30MHz THROUGHPUT
- 1.2MB FLOPPY DRIVE
- REAL-TIME CLOCK/CALENDAR
- SERIAL/PARALLEL/GAME PORTS
- EIGHT EXPANSION SLOTS
- 250WT POWER SUPPLY
- ENHANCED 101 KEY KEYBOARD
- **ONE YEAR ON-SITE SERVICE**

HARD DRIVE	12" MONO COMBO	14" EGA COMBO	14" VGA COMBO
40MB	$4295	$4695	$4995
80MB	$4795	$5195	$5495
160MB	$6095	$6495	$6795

Member of the FIVESTAR fileserver series.

FIVESTAR FS286

- INTEL 80286 CPU
  Operating at 6 or 10MHz
- 640KB MEMORY
- 10MHz THROUGHPUT
- 1.2MB FLOPPY DRIVE
- TWELVE EXPANSION SLOTS
- 238WT POWER SUPPLY
- REAL-TIME CLOCK/CALENDAR
- SERIAL AND PARALLEL PORTS
- ENHANCED 101 KEY KEYBOARD
- **ONE YEAR ON-SITE SERVICE**

HARD DRIVE	12" MONO COMBO	14" EGA COMBO	14" VGA COMBO
40MB	$2195	$2595	$2895
80MB	$2695	$3095	$3395
160MB	$3995	$4395	$4695

Member of the FIVESTAR fileserver series.

FIVESTAR FS386

- INTEL 80386 CPU
  Operating at 6 or 20MHz
  with zero wait states
- 2MB 32-BIT MEMORY
- 26MHz THROUGHPUT
- 1.2MB FLOPPY DRIVE
- TWELVE EXPANSION SLOTS
- 238WT POWER SUPPLY
- REAL-TIME CLOCK/CALENDAR
- SERIAL AND PARALLEL PORTS
- ENHANCED 101 KEY KEYBOARD
- **ONE YEAR ON-SITE SERVICE**

HARD DRIVE	12" MONO COMBO	14" EGA COMBO	14" VGA COMBO
40MB	$4695	$5095	$5395
80MB	$5195	$5595	$5895
160MB	$6495	$6895	$7195

FIVESTAR, selling thousands of computer systems nationwide, is a company you can talk to with confidence, providing products you can count on for years to come.

TO ORDER CALL TOLL-FREE

1-800-752-5555

In Texas (214) 242-7000 FAX # (214) 242-5689
Hours: M-F 8-6 CST

Solutions Built on Quality

FIVESTAR COMPUTERS

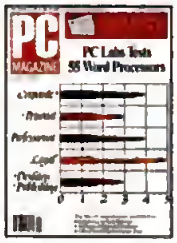
CIRCLE 386 ON READER SERVICE CARD

FILL IN THE INFORMATION GAPS IN YOUR PC MAGAZINE LIBRARY

Complete your library of IBM-Standard reference information with back issues of PC MAGAZINE.

3/29/88—Power to Go; 12 New Portebles Hit Tha Road—Pick Your Price And Performance; IBM's super-hi-res PS/2 displey edepter; 14 High-Resolution, Big-Screen Monitors For Desktop Publishing And All Applications; Connectivity Labs tests the Meridien LANStar PC; C-Scape; CALC function explained; A PC/LAN update; more.

3/15/88—Great graphics at your fingertips; PC Labs tests 7 PS/2 add-in memory boards; 10 top cherting packages; 18 integrated word processors examined; LasarJet II font handling; C's scanf function expleined; 1ax preperation software; real-time images for big screens; FREE Asprn printing utility; more.



2/29/88—PC Labs tests 55 word procassors; 1987 tax prep software; IBM's 20-MHz PS/2 Model 80 benchmarked; living with laser printers; keyboard monitors under OS/2; 1-2-3 competitor Surpess; PC Macferm; Primetime Personel time-management softwara; OS/2 ThinkTank upgrade; Connex comm softwere; more.

2/16/88—PC Labs tests 21 AT clones priced under $2,000; mestering laser printing; 14 bergain spreedsheets; naw mica from Microsoft and Logitech; the first 5 VGA add-in cards; Univation's LifeNet; TSR celculetor emuletion programs; Colorscen/2; understanding OS/2 keyboerd; FREE Run program; more.

1/26/88—IBM's OS/2 reviewed; PC Labs tests 20-MHz Oeskpro; do-it-yourself 386s; 17 Lotus 1-2-3 edd-ins; edd-ins for word processors, database management, and printing/graphics/utilities; shering laser printers; Turbo Pascel 4.0; music programs; 6 new FAX boerds examined; FREE Paint program; more.

1/12/88—THE BEST OF 1987—4th Annual Best & Worst Editors' Personel Picks; 1987 Awards for Technical Excellence; Tendy's 1000 Series; remote computing solutions; 4 Fiber-optic LANs; PC Lebs tests 5 communications programs; 9 plug-end-play dela transfer products; FREE Help utility; more.

12/22/87—Microsoft Excel reviawed; PC Labs tests 9 effordeble 386-based PCs; 16 EGA Plus cerds reviewed; 8 plotters; 6 TSR note-takers; 5 seles-leed treckers; Microsoft Windows; Omnis Quertz; Windows Graph; adding subdirectories end herd disk compatibility to rejuvenete old progrems; FREE PRN2FILE.COM program printing utility; more.

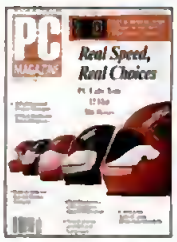
12/8/87—15 hard disk storage cards examined; mail-order hard disks; 16 CAD packages priced under $500; dBASE report writers; one-piece PCs; Word 4.0; E-Mail for LANs; the Price Waterhouse Report integrated accounting package; creating end using program libraries; FREE CO copy utility; more.

11/24/87—Apple's Macintosh II system exemined; networking IBM end Macintosh; optimizing Turbo Pascel; Power Programming column premieres; 386 operating systems; 5 full-page, black-on-white monitors for CAD end desktop publishing; disk caching; FREE Stick cursor stebilizer utility; more.

11/10/87—PC Labs torture-tests 106 printers; 36 laser printers, $1,795–$18,750, 300–1200 dpi; 65 dot-matrix printers; 5 daisy-wheel printers; soft-font primar; first look el Microsoft Excel; customizing cursors with CTYPE; Compaq Deskpro 86/20 and portable 386; FREE SAFARI internal error handling utility for PC-DOS; more.

10/27/87—PC Lebs tests 10 hot spreadshaets; 3-D spreadsheets that provida missing links; new models, new screens for laptops; 6 presentation-size monitors; 386 Turbo boards; the new MultiMate; text-oriented database software; FREE super clipboard utility works with any epplication, more.

10/13/87—Desktop publishing on the PC; PC Labs tests GEM Desktop Publishar, Tha Offica Publishar, PageMeker and Ventura Publisher; the best large-screen monitors, laser printers, mice and scannars; 7 highest-speed ATs; 32 breakthrough text end graphics scenners; 31 spelling checkers; FREE pop-up address book and dialer; more.



9/29/87—PC Labs tests 12 hot 386 boxes; 12 keyboerd macro programs; 13 full-featured project menagers; leptop edd-ons; 14 disk diagnostic programs; OS/2 and Lenguages columns premiere; first looks at Turbo C and IBM's Model 25; KBX keyboard extender examined; FREE RN subdirectory utility; more.

8/87—36 high-tech input devices examined including tablets, trackballs, touchscreans, light pens, mice end keyboerds; 9 Norton chellengers; 11 AT multifunction boards; 6 database graphic systems; TSR desktop organizers; 13 Sidekick rivals; FREE Oirectory Megic utility program; more.

Order back issues of PC MAGAZINE by returning the attached coupon or clearly written order form, and mail it with $8 per copy ordered ($9 in Canada and all other foreign countries) to: Ziff-Davis Publishing Co. • P.O. Box 5999 • Cherry Hill, NJ 08034 • Attn: F. Hunter. Other issues available. Call 1-609-354-4975. Mail orders only.

Please ship me the checked copies. I am enclosing $8 for each issue ordered ($9 in Canada and all other foreign countries, U.S. currency only).

Issue date:

☐ 3/29/88 ☐ 1/26/88 ☐ 11/24/87 ☐ 10/13/87
☐ 3/15/88 ☐ 1/12/88 ☐ ~~11/10/87~~ ☐ 9/29/87
☐ 2/29/88 ☐ 12/22/87 ☐ 10/27/87 ☐ 8/87
☐ 2/16/88 ☐ 12/8/87
☐ Other_____

Ziff-Davis Publishing Company, Attn: F. Hunter
P.O. Box 5999, Cherry Hill, NJ 08034

☐ **Check/Money Order enclosed $**_____

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____ ZIP_____

ORDER TODAY, QUANTITIES ARE LIMITED!

PC Magazine's Direct Marketing Connection

For PC Products and Services

For many of you, mail order is your primary means of purchasing PC products and services.

In fact, in recent interviews with our subscribers, we learned that 70% bought PC products and services through direct marketing channels during the past year.*

You buy direct because it's convenient, because you know exactly what you want and don't need any hand-holding.

PC MAGAZINE

The following special section, PC Magazine's Direct Marketing Connection, is what you've been demanding. It connects you with the direct marketers who are anxious to please you. By having them all in one place, you can quickly zero in on the products you need from the vendors you want to buy through.

*Starch Study, July 1986

Designer Carry Case for Laptops: Extra pockets for portable printer, battery pack, pocket modem, manuals & software etc. Comes with handle and shoulder strap. Fits NEC EL & HD and all Toshiba Laptops (except T3200).

Only ..... 149 With any Laptop 130

TOUCH BASE Systems World Port Pocket Modems: Both 1200 & 2400 use own battery. Operate on Bell and CCITT standards. 2400 includes AC Adapter and Carbon Copy PLUS comm sw. Comes with 25 pin female connector. For Toshiba adapter cable, add 20.

1200/2400 ..... 179/279 With any Laptop 1200/2400 ... 160/260

WonUnder: Single Card Expansion slot for Toshiba Laptops. Supports most Toshiba compatible cards of 10" or less such as LAN and EGA cards. If all you need is one expansion slot, this is your low cost alternative to expansion chassis. Specify T1100+, T1200 or T3100/T5100.

Only ..... 299 With any Laptop 270

NOVATION Parrot 1200 External modem: World's smallest (size of an audio cassette) and first to work from phone line power. Does not require any batteries or power from computer. Includes comm. software. Comes with 25 pin female connector. For Toshiba adapter cable, add 20.

Only ..... 129 With any Laptop 120

★ ABSOLUTELY THE *BEST* PRICES ON TOSHIBA LAPTOPS ANYWHERE ★

SYSTEMS

NEC MultiSpeed EL 1469
MultiSpeed HD w/20 MB 2249
Battery Pack-Specify EL or HD 89
Carry Case: EL/HD 89
Floppy 5.25" Ext 360K for HD 349
Modem 1200/2400 Int 279/349
SHARP 4502/4521 ..... 1199/1999
Sharp Modem 1200 Int 329
TOSHIBA LAPTOPS
T1000 w/out Case 749
T1000 w/Carry Case 799
T1100+ w/out Carry Case 1349
T1100+ w/Carry Case 1399
T1200 w/Carry Case 2239
T1200 w/out Carry Case 2199
T3120 w/Carry Case 2949
T3120 w/out Carry Case 2899
T3200 w/out Carry Case 3599
T3200 w/Carry Case 3679
T5100 w/out Carry Case 4679
T5100 w/Carry Case 4759
ACCESSORIES for Toshiba LapTops
With Laptop .... Use Second Price
AC Adapter: T1000/1100+ ... 75/60
AC Adapter: T1200 ..... 99/80
Auto Adapter: T1000/1100+ ... 85/50
Battery Charger: T1200 ... 239/210
Battery Pack: T1200 ..... 85/70
Carry Case for T1000 ..... 79/60
Carry Case: Specify model 89
Designer Carry Case w/pockets for SW, manuals, portable printer etc. Fits all (except T3200) ... 149/130
Expansion Chasis w/interface for 1100+/1200 or 3100/5100 ... 869/829
WonUnder: Expansion slot for 1100+, 1200 or 3100/5100 ..... 299/270
Floppy 5.25" Ext 360k 359/330
Memory 768k: T1000 ..... 299/290
Memory 384k: T1100+ 359/340
Memory 2MB: T3100 ..... 869/840
Memory 3MB: T3200 ..... 1239/1200
Memory 2MB: T5100 ..... 1049/1020
Modem 1200 Int: T1000 ..... 329/300
Modem 1200 No Slot: T1200 299
When Installed 350
Modems: T1100+/1200/3120/5100
Toshiba 1200 Int 299/280
MultiTech 1200 Int w/sw 239/220
Prometheus 1200 Int +sw 219/200
Prometheus 2400 Int + sw 329/300
Adaptamodem 2400 Int 329/300
World Port 1200 Ext 179/160
2400 Ext w/AC Adapter 279/260
Toshiba cable for Ext Modems 20
Numeric Keypad: T1000/1200 ..... 99/90
Numeric Keypad: T3100/3120 ..... 99/90
Brooklyn Bridge 99/90
Laplink Plus 109/100

PRINTERS

ALPS Allegro 24 pin 379
ALPS ALQ 200 Color, w/par cable
16/24 pin 439/479
ALQ 300 Color, wide, w/par cable
16/24 pin 629/679
BiDi Tractor: 200/300 ..... 79/99
Ribbon: ALQ Black/Color 15/20
P2000 w/Tractor & par cable 699
P2100 w/Tractor & par cable 1099
P2400 Color, w/Tractor, wide with par cable: 16/24 pin 929/979
★ **DICONIX InkJet 160 parallel**
with 3' or 9' cable 339
With any Laptop 320
NEC P2200 w/par cable 359
P660/CP660 w/par cable 459/539
P760/CP760 w/par cable 639/699
Uni-Di Tractor: P6/P7 ..... 80/90
Bi-Di Tractor: P6/P7 ..... 160/170
Cut Sht Fdr: P6/P7 ..... 230/290
★ **OKIDATA 193+ IBM w/cable** 429
★ **TOSHIBA 321SL/341SL** ... 509/679
KENSINGTON Printer Stand 20
★ With Printer ..... 10 ★

DRIVES & BACKUP

PLUS HARD CARD: Single Slot
20/40 MB 499/649
FUJITSU/TEAC 90 Day Warranty
360K/1.2 MB 99/129
Grey Face Plate - Add 5
SEAGATE: For PC/XT HALF HT
PRO PACK 20 MB (ST 225) 279
PRO PACK 30 MB (ST 238) 299
Fully Pretested. PRO PACK includes controller, cables, detailed & illustrated manual and software
One year warranty.
PC/XT Mtng Kit & Filler Plate 10
FOR AT: 40 MB w/partitioning sw
ST 251-1 Half Ht 28 ms 499
AT Mounting Kit 10
ARCHIVE: Uses Floppy Cont/DC2000
40 MB: External for PC/XT 449
MOUNTAIN: Uses Floppy Cont/DC2000
40 MB: Internal for AT 379
DC 2000 Single/Box of 5 ... 25/115
DC 600 Single/Box of 5 ..... 30/140

MONITORS

AMDEK Monitor 722 449
LOGITECH AutoSync with EGA Card, LogiMouse & Paint Show 669
MAGNAVOX MultiMode 8CM673 499
MITSUBISHI Diamond Scan 509
With Tilt & Swivel 525
Diamond Scan Tilt & Swivel 30
NEC MultiSync II-1402 569
NEC MultiSync PLUS 679
NEC MultiSync XL 2099
PGS UltraSync 529
SONY 1311CR-13" Trinitron Color Remote TV & RGB Monitor 449
Sony 1311 to IBM Cable 20
SONY Multiscan 1303 529
SONY Multiscan 1302 649
Sony 1303/2 to IBM Cable 20
Sony 1303/2 to MAC II Cable 30
TAXAN 770 MultiVision plus 519
ZENITH ZCM-1490 Flat Screen 649
With Zenith Tilt & Swivel 570
Zenith Tilt & Swivel 30
UNIVERSAL Tilt & Swivel 35

MATH/RAM CHIPS

64K RAM 120ns Set of 9 30
256K RAM 120ns Set of 9 200
8087-3 PC/XT 5 Mhz 115
8087-2 PC/XT 8 Mhz 145
80287-8 AT 6 Mhz 189
80287-8 AT 8 Mhz 239
80287-10 AT 10 Mhz 299
80387-16 for 386 Machines 499
80387-20 for 386 Machines 789

MODEMS

LAP TOP Modems ..... See SYSTEMS
EVEREX 1200 Int w/BitCom 95
2400 w BitCom Int/Ext 179/199
HAYES 1200B/1200 Ext 239/299
For SmartCom II Add 40
NOVATION Parrot 1200 Ext. Size of Cassette. Needs no pwr/battery 129
PROMETHEUS 2400G Ext 179
2400B Int half Card w/sw 149
TOUCHBASE SYSTEMS
World Port 1200 Ext 179
2400 Ext w/AC Adapter 279
ZOOM HC 2400 Int w/ProComm 149

FAX MACHINES

BELL Faxline 1299
SHARP UX-50 699
SHARP UX-90 for Books/Mags 979
SHARP UX-140/UX-160 ... 929/1129
SHARP FO-210/FO-300 ... 1099/1299
TOSHIBA 30100/3700 ... 1099/1529
THE COMPLETE PC Fax Board-Turns IBM PC/XT into G-III Fax 349

DISPLAY CARDS

With Monitor ..... Use Second Price
ATI VIP 299/270
GENOA SuperEGA HiRes+ 219/190
SuperVGA 5100 ..... 329/300
SuperVGA HiRes 5200-10 ..... 379/350
NEC MVA 1024 ..... 899/850
PARADISE AutoSwitch 480 ..... 199/160
Paradise VGA Plus 289/250
Paradise VGA Professional 449/400
TAXAN 557 Gold Card 199/190
VIDEO-7 Vega Deluxe 229/200
Vega VGA 299/270
Vega V-RAM VGA 549/500
ZENITH Z-449 ..... 299/280
9 to 15 Pin Connector 20
Gem Graph 50

KEYBOARD/MOUSE

KEYTRONIC 101 Keys for IBM PC, XT, AT with Function Keys on top row, separate Cursor Control Keypad and Numeric Keypad. With 3 years Keytronics warranty 119
OEM Version: Identical Keyboard w/90 day warranty from us 85
Keyboard Extension cable 10
LOGITECH with Plus software
PS/2 Mouse 85
C-7 Serial or Bus 89
HiRez Bus 119
Logitech Publisher 50
LogiPaint/LogiCadd 25/50
MICROSOFT Mouse: Bus or Ser 119
With Windows: Bus or Serial 159
MOUSE SYSTEMS PC Mouse
Bus or Serial 119

POWER

REPLACEMENT POWER SUPPLIES
For PC XT 150 Watts 69
For AT 200 Watts 89
DATASHIELD Surge Pro 100 79
300 Watts Turbo Backup 399
450 Watts Turbo Backup 469
625 Watts Turbo Backup 569
SOLID STATE UPS 3" High SS400/SS700 ..... 699/829
KENSINGTON Masterpiece 99
Masterpiece Plus 109
Masterpiece Remote 109

★ FREE DELIVERY ★

★ PREPAID ORDERS IN CONTINENTAL USA ONLY ★

Simply mail the check for the exact amount (CA add 6%) as shown here with your order. We will ship your order UPS Ground, FREE of any other charges. It is that simple. For 2 Day AIR shipment, add 2% (Min $10). For Printers & Monitors 5% (Min $30). Money order/Bank check orders shipped immediately. Personal/Co. checks delay shipment 2/3 weeks. (Credit Card orders are not considered prepaid).

★ PREPAID BY CHECK ONLY ★
★ POSTMARKED BY JULY 25, 1988 ★

★ SUPER SPECIALS ★

★ PREPAID BY CHECK ONLY ★
★ POSTMARKED BY JULY 25, 1988 ★

TOSHIBA T1000 w/Carry Case 795
T1000 w/Case & 768K Card 1080
T1100+ w/out Carry Case 1320
T1100+ w/Carry Case 1390
T1200 w/Carry Case 2190
T1200 w/out Carry Case 2160
T3120 w/Carry Case 2900
T3120 w/out Carry Case 2870
T3200 w/out Carry Case 3570
T3200 w/Carry Case 3650
T5100 w/out Carry Case 4625
T5100 w/Carry Case 4695
LOTUS Symphony 3.5" Ver 1.2 200
LOTUS Metro 3.5" Ver 1.0 30
BORLAND Sidekick Specify 5.25 or 3.5 30

DICONIX 150 Par w/3' cable w/prepaid order of any Laptop 315
TOSHIBA 321SL w/Par Cable 515
TOSHIBA 341SL w/Par Cable 685
768K Card for T1000 285
Numeric Keypad Specify Model 60
FLOPPY 5.25" Ext 360k 325
MODEM: 1200 Int for T1000 310
MODEMS: T1100+/1200/3120/5100
Toshiba 1200 Internal 285
MultiTech 1200 Int w/sw 230
Prometheus 1200 Int w/sw 210
Adaptamodem 2400 Int 315
Touchbase Systems World Port with Toshiba Cable 1200/2400 Ext ... 185/285

PLUS Hard Card 40 MB 640
BELL Faxline 1250
SHARP FO-210 1050
HAYES 1200B/1200 Ext 220/280
For SmartCom II Add 40
ARCHIVE 40MB External PC/XT 430
MOUNTAIN 40 MB Internal AT 370
KEYTRONIC 101 w/3 yr warranty 105
OEM Version w/90 day warranty 75
MOUSE SYSTEMS PC Mouse Bus 99
MICROSOFT w/Windows Bus or Serial 150
LOGITECH PS/2 Mouse 75
LOGITECH HiRez Bus Mouse 105
PC Paint Brush 25
Gem Graph 40

NEC MultiSpeed EL w/Case 1550
EL w/Case & 1200 Int Modem 1800
EL w/Case & 2400 Int Modem 1900
NEC MultiSpeed HD w/Case 2330
HD w/Case & 1200 Int Modem 2580
HD w/Case & 2400 Int Modem 2680
NEC 1402 w/Genoa EGA HiRes+ 750
NEC 1402 w/Paradise VGA plus 810
MITSUBISHI 1371 w/Genoa HiRes+ 560
TAXAN 770 Plus w/Genoa HiRes+ 700
SONY 1311 w/cable for IBM 480
SONY 1303 w/cable IBM or Apple 555
SONY 1302 w/cable IBM or Apple 680
ZENITH ZCM 1490 Flat Screen with Zenith Z-449 or Vega VGA 890

★ FOREIGN ORDERS ★

For foreign orders add special handling charge of $30 per order. Air shipments add 10% (Min $50). For Printers & Monitors 30% (Min $150). Some items may be more. Credit card orders add 5% to amount owed.

FAX: 714-861-2364

POLICY: Min. order $100 for COD/Credit Cards. Prepaid orders Min. $50. Prices & availability subject to change. Shipping charges vary (Min. $10). Prices reflect discount for advance payment. Personal/Co. checks delay shipment 2/3 weeks. Add 2% (Min. $5) for COD & Discover. 3% for MC/Visa and 5% for Amex & Optima. COD requires cash or cashier check. No showroom or walkin sales. Open acct. PO min. order $1000, call for special prices. All sales final. Refused shipments subject to a 20% charge (Min. $50). Not responsible for compatibility.

★ PICKUP HOURS: Mon-Fri: 8 to 5 pm. PLEASE CALL FIRST FOR WORKORDER #. ★

★ COD 1% ★ DISCOVER 1% ★ MC 2% ★ VISA 2% ★ AMEX 4% ★ OPTIMA 4% ★

★ APO ★ FPO ★

For APO/FPO orders, add special handling charge $30 per order. Shipping charges add 5% (Min. $20). For Printers & Monitors 10% (Min. $40). Some items may be more. No COD orders. Credit Card orders, add 5% to amount owed.

MICROBEST

714-897-2100

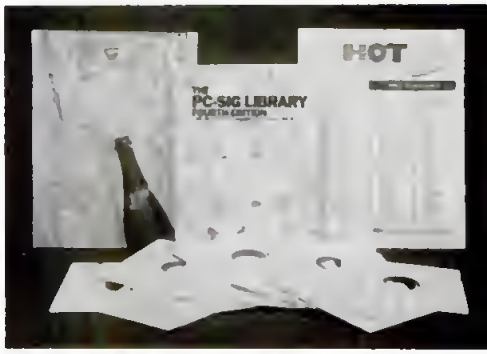
12605 HOOVER STREET, GARDEN GROVE, CA 92641

PLEASE REFER TO AD # PC 837

Great Software for your PC - $2 per disk (Reg. $6)

We are making this special offer to introduce you to membership in PC-SIG: The World's Largest Source of Low Cost Software for the IBM-PC and compatibles. PC-SIG disks are normally $6 each (less with membership) and come packed full of Shareware – software marketed in the revolutionary new way that allows you to try out a program before registering it with the author. PC-SIG provides your gateway to this software with the bimonthly SHAREWARE Magazine, Hotsheets and a 424+ page software directory. All this for a yearly membership fee of $20 (USA).

Some of the advantages of buying from PC-SIG: We are the oldest and largest Shareware vendor. Our disks are the latest versions. Free technical support by phone. Most complete library of Shareware: over 1000 disks. 48 hour shipping.



Join PC-SIG and receive 424 page directory, bi-monthly Shareware Magazine, Hotsheets and special discounts

Take any disk listed in this ad - $2 each - when you join today! Offer expires July 31, 1988.

Communications

- ☐ 499 PROCOMM: Extremely versatile telecommunications.
- ☐ 310,1022,1023 Q-MODEM: A favorite. Let's your computer talk via phone.
- ☐ 212,334,621 RBBS-PC: Set up your own bulletin board.

Computer Languages Education

- ☐ 577, 578 C TUTOR: Learn C language.
- ☐ 965 PASCAL COMPILER: Full-screen editor, incremental compiler and more.
- ☐ 254 PC-DOS HELP: Gives you on-line help to remember those DOS commands.
- ☐ 105 PC-PROFESSOR: Learn beginning BASIC.
- ☐ 775-778 PSEUDOSAM: Macro assemblers & debuggers for many popular microprocessors, including 8088/86/286s.
- ☐ 481 STILL RIVER SHELL: Menued DOS commands. Makes life easier.
- ☐ 403 TUTOR COM: Learn beginning DOS.

Databases

- ☐ 287,288 FILE EXPRESS: Customize, menu driven data base.
- ☐ 5, 730, 1015 PC-FILE+: The most powerful and popular data base.
- ☐ 830 WAMPUM: dBase III clone, but easier to use. (Hard disk req)

Educational

- ☐ 844 ABC FUN KEYS: For ages 2-5. Teaches the alphabet.
- ☐ 612 FOREIGN LANGUAGES: Beginning Spanish, French, German & Italian.
- ☐ 229 FUNNELS & BUCKETS: Fun game teaches younger children arithmetic.
- ☐ 320 PC-TOUCH: Typing tutor. (Color Req)
- ☐ 477 WORDGAMES: Stimulates the intellect.

Financial

- ☐ 164, 773 CASHTRAC: Manage checking accounts, track investments.
- ☐ 151 FINANCE MANAGER II: Double entry bookkeeping.
- ☐ 469,470 MR. BILL: Itemize invoices, age accounts, etc.
- ☐ 331 PC-GENERAL LEDGER: Written by a top financial manager.
- ☐ 575 PC-STOCK: Track & evaluate stock trends. (Color req)

Games

- ☐ 452 AMULET OF YENDOR: Hack, a dungeons & dragons adventure game.
- ☐ 708 BACKGAMMON: You against the computer. Also, Wheel of Fortune.
- ☐ 780 BRIDGE PAL: Computer plays 3 hands.
- ☐ 226 CRIBBAGE: And a few other games as well.
- ☐ 457 GREATEST ARCADE GAMES: Flightmare, Jump Joe, Spacewar (Color req.)
- ☐ 476 PATRICK'S BEST GAMES: Bugs Centipede, 3-D Packman, Castle, Packgal, Spacevad.
- ☐ 557 PINBALL RALLY: 3 great games of dexterity and speed. (Color req.)
- ☐ 120 PC-CHESS: Your move.
- ☐ 791 POKER: Play draw poker head to head. Or try some Blackjack.
- ☐ 694 SLEUTH: A murder has been committed.
- ☐ 197 TWO TREKS: Beam me up, Scottie!
- ☐ 891 WHEEL OF MISFORTUNE: Spin the wheel, win or go bankrupt!

Graphics

(Most require CGA or EGA Card)

- ☐ 701-704 DANCAD 3D (4 disks): Create and animate 3d drawings. (Hard disk req)
- ☐ 828 EDRAW: Draw flowcharts, schematics, even printed circuits!
- ☐ 763 FINGER PAINT: A 3d wire frame modeling program. (Runs also with Hercules Card.)
- ☐ 870 HGCIBM: Run color graphics programs with your Hercules Card!
- ☐ 788 IMAGE 3-D (EGA ver.): Create, view, edit 3d objects.
- ☐ 762 IMAGE 3-D (CGA ver.)
- ☐ 1001 MAC PASTE: Read, save, edit and print Readmac or Mac Paint pictures.
- ☐ 344,345 PC-KEYDRAW: Graphics and "slideshow" presentations.
- ☐ 244 SLIDE GENERATION: Create slides/transparencies.

Home & Hobbies

- ☐ 966 ASTROLOGY 94: Calculate and print charts.
- ☐ 361, 632 FAMILY HISTORY: Trace your family tree.
- ☐ 929 LOTTO: Will this really help you win the lottery?
- ☐ 395 HOME INVENTORY: Keep track of everything you own.

Music

- ☐ 127 PC-MUSICIAN: Compose and play your song.
- ☐ 279 PIANOMAN: Plays your music or its own in chords.

Office

- ☐ 608 AUTOMENU: Create easy access menus for your hard drive.
- ☐ 824 DESK COMMANDO: Tools to tame your hard drive.
- ☐ 404 EZ-FORMS: Create your own business forms.
- ☐ 388 FORM LETTERS: Variety of business letter formats.
- ☐ 483 MAILMONSTER: Add, edit, sort and print labels by categories.
- ☐ 405 PC-DESK TEAM: In memory calculator, calendar, phone dialer, alarm & more!

Printers

- ☐ 517 IMAGE PRINT: Letter quality from your dot matrix.
- ☐ 718 LQ PRINTER: Print fancy fonts on your dot matrix.
- ☐ 523 SIDEWRITER: Print banners or wide spreadsheets.

Religion

- ☐ 974 BIBLE QUIZ PLUS: Learn the Bible trivia game.
- ☐ 766-772 THE BIBLE (7 disks): King James version.
- ☐ 581, 582 WORD WORKER: Performs text searches of words in the Bible.

Security Hacking

- ☐ 598 MASTER KEY: Like Norton Utilities. Recover lost files, etc.
- ☐ 414 UNPROTECT/PROTECT: Copy a variety of copy protected disks.

Spreadsheets

- ☐ 524,525 EXPRESS CALC: Powerful but friendly spreadsheet.
- ☐ 199,1016,1017 PC-CALC: Like Lotus 1-2-3 but easier.

Word Processing

- ☐ 719 LETTER WRITER: Print out "personalized" letters.
- ☐ 528 NEW YORK WORD: Allows split screen, mail merge & more.
- ☐ 480 PC-OUTLINE: Like ThinkTank. Organize your ideas & thoughts.
- ☐ 455,681,682 PC-TYPE: Jim Button's own word processor. Has it all.
- ☐ 78, 627 PC-WRITE: Powerful, multi featured, spelling checker, laser support.

Please send the disks I have checked above.

_____ disks x $2 each = _____

1 year PC-SIG Membership = $20.00

3 1/2" - add $1 per disk = _____

FREE Shipping and Handling

Amount enclosed $ _____

By: ☐ Check ☐ Visa ☐ M/C

Card No: _____

Exp. _____ Sig. _____

Name _____

Address _____

City: _____ State _____ Zip _____

PC-SIG 737

PC-SIG
1030D East Duane Ave
Sunnyvale, CA 94086

Offer valid in USA only · Dealer Inquiries Invited

Order By Phone:
800/245-6717
(In Calif. 800/222-2996)

CIRCLE 145 ON READER SERVICE CARD

REACH YOUR FULL POTENTIAL

WITH American Semiconductor®

Reach your full potential with America's first choice, American Semiconductor. Now, with over a billion in financing available, it's easy to own the computer system that you want and need.

INSTANT CREDIT W/AMERICAN SEMICONDUCTOR CHARGE CARD

FREE FLIGHT SIMULATOR
LIMITED TIME OFFER!!
WITH COMPUTER PURCHASE

NOVELL OS/2 COMPATIBLE!

NOT A LEASE YOU OWN IT!!

$35.mo. TURBO XT MODEL #5301
- Selectable 4.77, 8 & 10MHz Processing Speed • 0-16MB RAM Available • Bios • One 360K Floppy Drive • Floppy Controller w/Cable • Eight Expansion Slots • PC/XT-AT Enhanced Keyboard

RETAIL VALUE $1099
OUR PRICE $599

$39.mo. TURBO XT MODEL #5302
- Selectable 4.77, 8 & 10MHz Processing Speed • 0-16MB RAM Available • Bios • 16 Bit 8088-2 CPU • One 360K Floppy Drive • Multi I/O (w/Floppy Controller, Clock/Calendar, Parallel, Serial & Game Port) • Eight Expansion Slots • PC/XT Enhanced Keyboard

RETAIL VALUE $1599
OUR PRICE $686

$45.mo. TURBO XT MODEL #5303
- Selectable 4.77, 8 & 10MHz Processing Speed • 0-16MB RAM Available • Bios • 8088-2 CPU • One 360K Floppy Drive • Multi I/O (w/Floppy Controller, Clock/Calendar, Parallel, Serial & Game Port) • Eight Expansion Slots • One 10MB Hard Drive (w/ Controller) • AT Enhanced Keyboard

RETAIL VALUE $1999
OUR PRICE $978

$49.mo. TURBO XT MODEL #5304
- 8 & 10MHz Processing Speed • 0-16MB RAM Available • Bios • 8088-2 CPU • Two 360K Half/Height Floppy Drive • Multi I/O (w/Floppy Controller, Clock/Calendar, Parallel, Serial & Game Port) • One 20MB Hard Drive (w/Controller) • Turbo/Normal Mode Either Software or Hardware Selectable • Eight Expansion Slots • PC/XT-AT Enhanced Keyboard

RETAIL VALUE $2499
OUR PRICE $1171

$49.mo. TURBO XT MODEL #5305
- 8 & 10MHz Clock Speed • 0-16MB RAM Available • Bios • 16 Bit 8088-2 CPU • Two 360K Half/Height Floppy Drives • Multi I/O (w/Floppy Controller, Clock/Calendar, Parallel, Serial & Game Port) • 20MB Hard Drive (w/Controller) • Turbo/Normal Mode Either Software or Hardware Selectable • Eight Expansion Slots • PC/AT Enhanced Keyboard

RETAIL VALUE $2999
OUR PRICE $1298

$55.mo. TURBO XT MODEL #5306
- 8 & 10MHz Processing Speed • 0-16MB RAM Available • Bios • 16 Bit 8088-2 CPU • Two 360K Half/Height Floppy Drives • Multi I/O (w/Controller, Clock/Calendar, Parallel, Serial & Game Port) • 20MB Hard Drive (w/Controller) • Turbo Normal Mode Either Software or Hardware Selectable • Eight Expansion Slots • PC/XT-AT Enhanced Keyboard • IBM Compatible Enhanced Graphic Adapter (EGA) • High Resolution EGA Monitor

RETAIL VALUE $3899
OUR PRICE $1799

$55.mo. TURBO AT MODEL #5501
- 80286 Based CPU • 0-16MB RAM Available • Bios • 1.2MB Half/Height Floppy Drive • 20MB Hard Drive (w/Controller) • Eight Expansion Slots • Parallel Port • AT Enhanced Keyboard • Performance 16,12,10,8.6MHz Available

RETAIL VALUE $3099
OUR PRICE $1616

$59.mo. TURBO AT MODEL #5502
- 12MHz Clock Speed • 0-16MB RAM Available • Bios • Intel 80286 Microprocessor • 1.2MB Half/Height Floppy Drive • 30MB Hard Drive (w/Controller) • Eight Expansion Slots • Serial/Parallel Adapter • AT Enhanced Keyboard • Performance 16,12,10,8.6MHz Available

RETAIL VALUE $4499
OUR PRICE $1743

OVER 25,000 CUSTOMERS

5 YEAR WARRANTY

from **$45.mo.** LAPTOP MODEL #5402
- 80188 Compatible (7.16MHz) • ROM 32KBN (BIOS, etc.) • RAM 256KB standard, expandable to 640KB • 3.5" 720 KB FDD x 1 • Optional 2nd 3.5" FDD or 20MB HDD • Supertwist Crystal Display • Capacity: 80 characters x 24 lines (640 x 200 pixels) • 0°/180° tilt angle adjustment • 78/88-key step-sculptured keyboard with integrated numeric keypad • Parallel (Centronics) port x 1 • External 5¼" FDD unit I/F x 1 • Slot for EPROM card: CRT adaptor for EMS card x 1 • Slot for Modem Card or SIO card x 1 • 12⅛" (W) x 3" (H) x 13¾" (D) • Approx 10 lbs. • Lead battery (7 hrs. operation) • AC adaptor • MS-DOS® 2.11

OUR PRICE $955.-$2995.

from **$79.mo.** 386 MODEL #5701
- 16-20MHz Processor Speed • Intel 80386 Microprocessor • 32 Bit Architecture • Compatible with 8MHz 80286 Hardware & Software • Bios • Speed Selection 16,8,6.4 77 MHz • Relocation of Bios • EGA Bios to 32 Bit High Speed RAM for Lightning Execution • Real Time Clock • 4,8 or 16MHz 80287 Co-processor Socket • Standard 32 Bit • 0-16 RAM Available • Connectors for Attaching up to 16MB of Memory • 1.2MB Half/Height Floppy Drive • Eight Expansion Slots • Serial/Parallel Adapter • AT Enhanced Keyboard

RETAIL VALUE $6999
OUR PRICE $2476

*Tower case as shown optional

NO MONEY DOWN!

Even if you have a computer...
We'll sell you add-ons from our **TOP QUALITY** products, and **FINANCE** them too!

*Available on XT Mother Boards.

DRAMS, MONITORS ARE ADDITIONAL. SURGE PROTECTOR/POWER DISTRIBUTION CENTERS ARE OPTIONAL AND AVAILABLE FOR ONLY $39.95.

ADD 3.86%

VISA

1-800-825-SAVE

OVER 25,000 CUSTOMERS

ORDER TOLL FREE!
1-800-237-5758 EXT. 812
CUSTOMER SERVICE (813) 886-8631
TECHNICAL SUPPORT
(813) 855-7066
OPEN MON-FRI 9 AM — Late, Late, Late
OPEN SATURDAY 9 AM-5 PM (EST)
CORPORATE HEADQUARTERS: 15340 RACE TRACK RD., TAMPA, FL 33618, (813) 886-8631

OFFICES NOW OPEN: TAMPA—MIAMI—LOS ANGELES—WASHINGTON, D.C.—TAIPEI, TAIWAN—TOKYO, JAPAN

PRICES SUBJECT TO CHANGE DUE TO AVAILABILITY AND MARKET FLUCTUATIONS.
VOID WHERE PROHIBITED. $25.00 CREDIT APPLICATION FEE.

CIRCLE 521 ON READER SERVICE CARD

COMPUTER DISCOUNT WAREHOUSE™

NEC

NEC Multispeed	$1348.64
NEC Multispeed EL	1498.76
NEC Multispeed HD w/20 Meg	2365.77
NEC Powermate 2, 40 Meg	NEW
NEC Powermate 2, 66 Meg	LOWER
NEC Powermate 386, 66 Meg	NEC
NEC Powermate 386, 130 Meg	PRICES

TOSHIBA

1100 Plus	1484.10
3100 w/20 Meg	2998.50
1000	799.41
1200	2237.56
3200	SPECIAL BUY
5100	NEW MODEL

WHY PAY RETAIL?

Nobody Sells For Less

CALL FOR LOWEST CUSTOM QUOTES

PACKARD BELL

Free Sidekick & Tutorial

PB86 (XT Turbo) 512K, 1 Floppy, DOS & GW-Basic, Serial/Parallel, Color/Monochrome Adapter & Keyboard $645.14

VT286 (AT Compatible) 10 MHz, 0 Wait State, 640K 1.2M Floppy, Serial/Parallel, F/H Controller, Keyboard 1299.36

SAMSUNG

S-300 4/8 MHz, 512K, 5 Slots S/P/C, Monographics board, DOS, Keyboard

S-300, 1 Floppy	749.50
S-300, 20 Meg	989.65
S-300, 45 Meg	1117.82

S-500 AT Compatible 8/10 MHz, 8 Slots, S/P/C, Monographics Board, DOS, Keyboard

S-500, 1.2M Floppy	$1095.45
S-500, 20 Meg	1469.60
S-500, 40 Meg	1624.45

HARDWARE, SOFTWARE & PERIPHERALS AT *DISCOUNT* PRICES

COMPUTERS

ASI

MDL 80	$1619.70	MDL 170	$2988.36
MDL 90	1916.18	MDL 300	3490.40
MDL 120	2260.05	MDL 340	3945.65
MDL 140	2629.56	MDL 390	5589.40

IBM PS2

MDL 30, 2 dr	$1272.28	MDL 60, 70 Meg	$3469.60
MDL 30, 20 Meg	1725.17	MDL 80, 40 Meg	4497.67
MDL 60, 40 Meg	3340.15	MDL 80, 70 Meg	5677.33

COMPAQ™

Deskpro 286, Model 1	$2095.55
Deskpro 286, 40 Meg	2580.19
Deskpro 286, 70 Meg	2895.20
Deskpro 386, Model 60, 20 MHz	5579.30
Deskpro 386, Model 130, 20 MHz	7059.92
Deskpro 386, Model 300, 20 MHz	9168.20
Portable II Model 2	1896.10
Portable II, Model 4	2797.00
Portable III Model 20	3577.85
Portable III, Model 40	4159.33

LASER TURBO

XT Turbo, 512K 1 floppy P/S/G, Enhanced keyboard, EMS mem	$699.10
XT Turbo, 1 floppy 20 Meg	989.34
XT Turbo, 1 floppy 40 Meg	1184.22

AT&T

6300 w/640K 1 Drive	$849.20
6300 w/640K 1 Floppy, 20 Meg	1159.60
6300 w/640K 1 Floppy, 40 Meg	1410.90
6300 WGS	1099.42
6312/6386 WGS	CALL

TOSHIBA

T1100 Plus	$1484.10	T1000	$749.41
T1200, 20 Meg	2998.50	T1200	3237.56
T3200	SPECIAL BUY	T5100	NEW MODEL

PACKARD BELL

PB88 (XT Turbo)	$645.64
PB88 w/1 floppy 20 Meg	956.80
VT286	1299.36
VT286 w/20 Meg	1573.50
VT286 w/40 Meg	1724.10
VT386	NEW MODEL

WYSE

MDL 2108	$1082.50	MDL 2214	$1868.30
MDL 2112	1568.20	MDL 3216	2658.05

Zenith data systems

Supersport Model 2	ALL ZENITH
Supersport Model 20	MODELS IN
Supersport 286 Model 20	STOCK CALL
2-183, 20 Meg	FOR PRICE

Other Computers Available Upon Request

DRIVE CARDS

MINISCRIBE 30 Meg Flashcard	$425.96
MOUNTAIN 20 Meg/30 Meg	549.40/705.80
PLUS DEVELOPMENT 20 Meg	555.55
PLUS DEVELOPMENT 40 Meg	765.80
WESTERN DIGITAL 30 Meg	416.30

DRIVES FOR ATs & 286s

MINISCRIBE 40 Meg 28ms	$609.40
MINISCRIBE 80 Meg 28ms	849.45
PRIAM 40 Meg hard disk	669.55
PRIAM 80 Meg hard disk	777.85
PRIAM 130 Meg hard disk	1967.68
SEAGATE 4038 30 Meg hard disk	479.80
SEAGATE 4053 40 Meg hard disk	589.98
SEAGATE 4096 80 Meg hard disk	739.58
360K floppy drive	110.12

PRINTERS

EPSON

EX800	CALL	LQ500	ALL
FX86e	COW™	LQ850	EPSON
FX286e	FOR BEST	LQ1050	MODELS
LX800	PRICE	LQ-2500	IN STOCK

DIGIMIX by Kodak

150P / 300 ..... $319.17 / 479.17

IBM

Pro Printer II $447.95 Quietwriter III $1295.62

NEC

Color P6	$569.74	Color P7	$722.12
P660	479.22	P760	639.35
P560XL	914.75	P960XL	1067.70
P2200	359.65	8850	1080.75
3550	744.12	CALL FOR ACCESSORIES	

OKIDATA

Okimate 20	$122.74	ML 320	$336.63
ML 182S	279.78	ML 321	472.20
ML 182P	232.50	ML 390	469.96
LASERLINE 6	1229.30	ML 391	636.48
ML 292 Plus	377.44	ML 393	949.55
ML 293 Plus	516.55	ML 393 Color	1057.80
ML 294	737.10	CALL FOR ACCESSORIES	

PANASONIC

1080i	$179.60	1091i	$219.85
1092i	334.28	1592	433.44
1595	459.45	3131	274.32
3151	409.52	1524	579.10

CITIZEN

120D	$169.55	MSP50	$385.64
MSP40	316.40	MSP55	489.60
MSP45	458.20	Premiere 35	477.17

TOSHIBA

P321SL	$494.85	P351-2 Color	$1199.95
P341SL	634.17	P351SX	1019.45

LASER PRINTERS

H.P Laser Jet Model 2	$1899.40
AST Turbolaser P/S	IN STOCK
N.P. Deskjet	689.00
NEC LC860 A/C890	1982.44 / 3295.60
PANASONIC Laser	1605.35
TOSHIBA PageLaser	SAVE

PLOTTERS, DIGITIZERS & SCANNERS

CALCOMP

1023	$3838.38	1043	$6535.15
1042	7539.95	1044	10,305.06

SUMMASKETCH

12x12	$376.30	12x18	$632.50

HEWLETT PACKARD		HOUSTON INSTRUMENTS
HP7440A	$968.30	HI DMP 42
HP7475A	1417.44	HI DMP 52
HP7550	2926.58	HI DMP 52MP
HP7570	LOWEST PRICE	HI DMP 56A
HP SCANJET	SAVE	HI DMP 61
		HI DMP 62

FAX MACHINES & PAPER SHREDDERS

From Here to Anywhere in 18 Seconds

SHARP FO-300	$1279.10
SHARP FO-500	1599.95
TOSHIBA 3010	1314.44
GBC 1656	1459.80
GBC 1236S	915.44

FLOPPIES, DRIVES & TAPES

1/2 height floppy drive	$99.00
MINISCRIBE 20 Meg 1/2 height w/cont	329.14
MINISCRIBE 30 Meg 1/2 height w/RLL	345.95
SEAGATE 20 Meg 1/2 height hard drive	295.69
SEAGATE 30 Meg 1/2 height w/RLL	309.72
SEAGATE 40 Meg 1/2 height	432.50
GENOA 60 Meg int tape	734.50
GENOA 60 Meg ext tape	895.10
GENOA 125 Meg int tape	995.85
IOMEGA BERNOULLI 20 + 20	1829.99
IOMEGA 20 Meg 1/2 height int	995.55
IOMEGA 20+20 External 5¼	1795.73
IRWIN 10 Meg tape backup	259.34
IRWIN 20 M/40 M Internal Tape	399.10/539.20
MOUNTAIN 4440 int	368.80
MOUNTAIN 4440 ext	547.75

NOVELL NETWORKING

SANTA CLARA Diskless Workstation ... $648.40

SOFTWARE & STARTER KITS

WESTERN DIGITAL 3 Node LAN kit w/Western Digital software	$720.34
Entry-level 286 Starter Kit 4 Users	489.90
Entry-level 286 Starter Kit 8 Users	SAVE
NOVELL 286 Software w/Keycard	1569.09
NOVELL SFT Netware Level I	2148.66
NOVELL SFT Netware Level II V2.1	2757.80
Nondedicated Netware Software 286 w/Keycard	1495.09

INTERFACE CARDS

ARCNET PC110 LANBoard	$199.27
ARCNET PC210 LANBoard	249.50
ETHERNET Interface Connector	329.80
ETHERNET Plus Board (for 286)	799.74
G-NET Interface Card w/cable	299.52
WESTERN DIGITAL Ethernet Cards	269.18

ACCESSORIES

ARCNET Passive Hub	$85.00
ARCNET Active Hub	499.98
Ethernet Terminators	37.50

All Sales People are Novell trained and authorized. Call COW for all your Networking Hardware & Software.

MONITOR INTERFACE CARDS

COW™ color card	$ 99.00
COW™ monographics card w/p	99.00
GENOA Spectrum (color monographic w/p)	168.75
HERCULES color card w/o	146.16
HERCULES monographics plus w/p	179.84
TAXAN MONOGRAPHIC w/o	99.00

MONOCHROME MONITORS

AT&T Monochrome Monitor	$189.40
AMDEK 310A/410A	119.98/149.99
AMDEK 1260	679.78
COMPAQ monochrome monitor	188.40
COMPAQ VGA Mono	IN STOCK
IBM PS2 8503	187.90
NEC Multisync GS	184.52
NEC Monograph	1297.25
PGS MAX 12E amber color	139.40
PACKARD BELL Green or Amber	86.95
TAXAN 123 Green/124 Amber	119.50/124.95

COLOR GRAPHIC MONITORS

AMDEK color 600T/722	$349.24/444.49
IBM PS2 8512 Color	428.40
IBM PS2 8513 Enhanced Color	496.20
SAMSUNG RGB Comp	238.60
PGS HX 12 Plus	417.15
TAXAN 650/720	469.90/299.80
MAGNAVOX 8762	259.05

VGA & EGA PRODUCTS

VGA & EGA MONITORS

COMPAQ VGA monitor	$548.68
MAGNAVOX 943EGA	367.40
NEC Multisync II/PLUS	509.76/668.10
NEC Multisync XL 19 inch	1974.40
PACKARD BELL VGA Monitor	389.95
PGS Ultrasync	515.33
SONY Multiscan 1303/1302	599.45/549.25
TAXAN 770 PLUS	499.40
ZENITH Z-1490	768.31

VGA DISPLAY CARDS

ATI VGA VIP	$307.24
GENOA VGA	289.70
PARADISE VGA	297.68
ORCHID VGA	278.14
VIDEO-7 VGA	299.15

EGA DISPLAY CARDS

ATI Wonder Card	199.95
GENOA Super EGA Hi-Res 800 x 600	234.40
LOGITECH EGA Card w/mouse	217.18
NEC MVA 1024	960.50
NEC GB-1 640x480	239.43
PARADISE Auto Switch EGA 480	169.65
QUADRAM Prosync	285.40
VIDEO 7 VGA Deluxe	249.74

MODEMS & COMMUNICATIONS

AST 5251-11 Plus	$519.04
EVEREX 12008/2400B	109.90/199.50
IRMA 3278/79	695.17
PACKARD BELL 2400 Int/2400 Ext	189.95/199.22

Hayes

HAYES 1200	$209.60	2400	$424.56
1200B	269.20	2400B	379.65

U.S. Robotics

1200	$198.40	2400	$299.76
1200 External	129.10	9600 HST	665.20

Ven-Tel

1200 Int	$164.50	2400 Int.	$299.10
1200 Plus	228.88	2400 Ext.	389.44

ORCHID

8087-2/8087-3	$159.33/122.50
80287-6/-8/-10	174.30/299.55/339.25
80387-16/80387-20	497.66/777.44

MISC. & ACCESSORIES

A-B Switching Box (par. or serial)	$39.95
BASF 5 Pack ul 10 DS/DD w/case	49.00
KENSINGTON Masterpiece	99.98
KENSINGTON Masterpiece Plus	119.40
KEYTRONICS 5151 IBM or AT&T	149.95
KEYTRONICS 101	104.65
Printer Cable (IBM to Centronics) 6 ft	19.99
XT Power Supply 150 Watt	89.95

BATTERY BACKUP & SURGE

PERMA POWER 6 Outlet Surge Supp ... $29.40

TRIPPLITE

BC-450	$419.70	LC-1200	$126.85
BC-1200	748.58	LC-1800	189.75
4 outlet	44.25		

DATASHIELD

500 Watt	$560.05	1200 Watt	$994.75
800 Watt	638.50	6 Outlet Surge	27.85

MICE

LOGITECH HiRez	$99.95
LOGITECH C7/Bus	89.95/109.95
LOGITECH Logimouse C7 w/publisher	124.85
MICROSOFT Mouse (Bus Version)	119.34
MICROSOFT Mouse (Serial Version)	131.26
MOUSE SYSTEMS (Serial Version)	99.55
MOUSE SYSTEMS (Bus Version)	108.77

MOST ORDERS SHIPPED WITHIN 48 HOURS.

HIGH VOLUME BIDS INVITED
730 Anthony Trail, Northbrook, IL 60062 FAX-A-BID (312) 291-1737

If you find a better price call us before you buy.

WHY WAIT? CALL COMPUTER DISCOUNT WAREHOUSE™ NOW!

Nationwide Toll Free

(800) 233-4426

In Illinois (312) 498-1426

FAX (312) 291-1737

CHARTER MEMBER MMC MICROCOMPUTER MARKETING COUNCIL of the Direct Marketing Association, Inc.

MEMBER

B728

WORDPERFECT 4.2 5¼/3½	$198.80/214.80
dBase III + 5¼/3½	289.80/404.80
LOTUS 1-2-3 5¼/3½	359.80/357.80
Paradox Version 2.0	399.80
Ventura Software Version 1.1	499.80
MICROSOFT Word V 4/Excel	349.80/219.80

Credit Card charges are not submitted until time of shipment. Shipping and handling additional. On all hard drive orders and orders under $200.00 please add $5.00 handling fee. Non-defective returns subject to restocking fee. All prices reflect 3% discount for cash. Allow 10 business days for shipping when paying by personal check. Software, disks and other electronic components are not returnable. All pricing subject to change. ™ Registered trademarks of IBM and ©MMIC

Credit card charges are not submitted until time of shipment

CIRCLE 109 ON READER SERVICE CARD

SAVE MONEY ON COMPUTERS

COMPUTER PROOUCTS AT THE LOWEST PRICES
WE ARE YOUR NETWORKING SPECIALIST.

COMPUTERS

THE ALL NEW IBM PERSONAL SYSTEM 2

MODEL 25 MONOCHROME 1 FLOPPY	$1 045 00
MODEL 25 MONOCHROME 2 FLOPPIES	$1 222 00
MODEL 25 COLOR 1 FLOPPY	$1 339 00
MODEL 25 COLOR 2 FLOPPIES	$1,499 00
MODEL 30-002 (2 720K FLOPPIES)	$1 259 00
MODEL 30-021 (20MB HARD DRIVE)	$1 699 00

80286 SYSTEMS

MODEL 50-021 (20MB HARD DRIVE)	$2 655 00
IBM MODEL 80 & 80	ON SPECIAL!!

IBM PERSONAL SYSTEM/2 DISPLAYS

MONOCHROME 8503	$189 00
COLOR-8512 (14")	$432 00
COLOR 8513 (12")	$496 00
COLOR 8514 (16")	$1 150 00

NEW PERSONAL SYSTEM 2 SOFTWARE

IBM DOS 3 3	$96 00

LAPTOP COMPUTERS

NEC MULTISPEED EL2, BACKLIT	$1 499 00
NEC MULTISPEED HD	$2 360 00
TOSHIBA 1000 IN STOCK	$859 00
TOSHIBA 1100 PLUS	$1 464 00
TOSHIBA 1200	$2 237 00
TOSHIBA 3100-20	$2 998 00
NEW! TOSHIBA 3200	CALL
NEW! TOSHIBA 5100	CALL
ZENITH 183 640K 1 3 5" FLOPPY, 20MB HARD DRIVE	$2,340 00

EVEREX

EVEREX 286/10 512K 1 2M FLOPPY ENHANCED KEYBOARD	$1,119 00
EVEREX 386 18 1MB 1 2M FLOPPY ENHANCED KEYBOARD	$1 795 00

WYSE COMPUTERS AND TERMINALS

MODEL 2108	$1 080 00
MODEL 2108-20	$1 410 00
MODEL 2112	$1 499 00
MODEL 2112-40	$2 299 00
MODEL 2214	$1 799 00
MODEL 2114-40	$2 599 00
MODEL 3216-01	$2 499 00
MODEL 3216-40	$3,339 00
AT STYLE ENHANCED KEYBOARD	$109 00

TERMINALS

MODEL 30 GREEN OR AMBER	$309 00
MODEL 50 GREEN OR AMBER	$379 00
MODEL 60 GREEN AMBER OR WHITE	$339 00
MODEL 85 GREEN OR AMBER	$469 00
MODEL 60 KEYBOARD	$115 00

***** LASER XT AND SSI 286 SPECIALS *****

NATIONALLY RENOWNED LASER XT W 256K, 1 FLOPPY	$499 00
LASER XT W 640K 2 FLOPPIES MULTI I/O CARD TTL MONOCHROME MONITOR MONOGRAPHICS BOARD TURBO 10 MHz MOTHERBOARD	$799 00
SPECIAL! SSI AT 286-10 512K 1 2MB FLOPPY HD/FD CONTROLLER AT STYLE KEYBOARD 8 EXPANSION SLOTS, 195 WATT POWER SUPPLY, FULL 1 YEAR WARRANTY	$1,119 00

COMPAQ ™ SPECIALS

DESKPRO MODEL II 256K 2 360K FLOPPIES	$1,239 00
SPECIAL! DESKPRO 286 MODEL I	$1,889 00
DESKPRO 286 W 40MB HARD DRIVE	$2 579 00
DESKPRO 286 W 80MB HARD DRIVE	$2 999 00
DESKPRO 386 W 40MB HARD DRIVE	$4,660 00
DESKPRO 386 MODEL 60 20MHz	$5,559 00
DESKPRO 386 MODEL 130 20MHz	$7 029 26
DESKPRO 386 MODEL 300 20MHz	$9 159 00
*** NEW COMPAQ PORTABLE III ***	IN STOCK

AST SPECIALS

AST MODEL 80	CALL
AST MODEL 90	FOR
AST MODEL 120	BEST
AST MODEL 140	PRICE
AST MODEL 170	IN STOCK
AST MODEL 300 340 & 390	IN STOCK

MONOCHROME MONITORS

LTI TTL MONITOR TILT SWIVEL, GREEN OR AMBER	$85 00
PACKARD BELL AMBER OR GREEN	$79 99
TAXAN 123 GREEN MONOCHROME	$105 50
TAXAN 124 AMBER MONOCHROME	$110 00
AMDEK 310A AMBER MONOCHROME	$119 00
AMDEK 410A AMBER MONOCHROME	$149 00
WYSE 530 GREEN OR AMBER	$175 36
COMPAQ MONOCHROME MONITOR	$191 00
NEC MONOGRAPH	$1 279 00
WYSE 700 1280 X 800 RES W GRAPHICS CARD	$767 20
AST DISPLAY MONOCHROME MONITOR 14" BLACK & WHITE	$179 50

COLOR MONITORS

SAMSUNG COLOR 640 X 200	$259 00
SPECIAL! MAGNAVOX COLOR MONITOR	$269 00
TAXAN 720 COLOR MONITOR	$299 50
TAXAN 635	$397 50
RAGE COLOR MONITOR	$289 00
SPECIAL! AMDEK COLOR 600T	$349 00
AMDEK COLOR 722	$444 00

EGA MONITORS

AST EGA DISPLAY	$509 25
MAGNAVOX EGA	$385 00
SAMSUNG EGA MONITOR	$389 00
SPECIAL! GOLDSTAR EGA MONITOR	$359 00
NEW! TAXAN 770 MULTISYNC	$539 00
COMPAQ VGA MONITOR	$524 25
NEW! NEC MULTISYNC II	$599 00
NEC MULTISYNC PLUS 14" 960 x 720	CALL
NEC MULTISYNC XL 19" 1024 x 768	$1 955 00
ZENITH FTM ZCM-1490	$689 00
SONY MULTISCAN	$649 00

DISK DRIVES

MINISCRIBE 20MB 3 5" W/WD #8425	$299 00
MINISCRIBE 80MB 1/2 HT FOR AT W/CONT	$499 00
SEAGATE ST225 20MB W/CONT	$289 00
SEAGATE ST238 30MB W/RLL CONT	$309 00
SEAGATE ST251 40MB 1/2 HEIGHT - AT	$399 00
SEAGATE ST251-1 40MB 1/2 HT 28 MLS	$499 00
SEAGATE ST125I-PS/2 20MB 1/2 HT	$359 00
20MB MINISCRIBE HARD CARD	$399 00
30MB MINISCRIBE HARD CARD PLUS HARDCARD 20 / 40	$419 00 / $559 00 / $670 00
SPECIAL! 40MB 1/2 HGT MINISCRIBE	$350 00
SPECIAL! SEAGATE ST4096 80MB W/ON-TRAC	$760 00
SPECIAL! FUJITSU 360K 1/2 HGT FLOPPY	$79 00
COMPAQ 360K FULL HGT FLOPPY	$47 00
TAXAN TDM-S S 25" EXTERNAL FDD FOR IBM PS/2	$249 00
BERNOULLI BOX 10 + 10	$1,395 00
SPECIAL! BERNOULLI BOX 20 + 20	$1 599 00
NON BOOTABLE CONTROLLER	$159 00
BOOTABLE CONTROLLER	209 00
SPECIAL! IRWIN 10MB TAPE BACK-UP	$259 00
IRWIN 20MB AND 40MB INTERNAL TAPE BACK-UPS	IN STOCK
ARCHIVE 40MB TAPE BACK-UP UNIT FOR XT/AT	$339 00

NOVELL NETWORKING

TURNKEY NETWORK SYSTEM

10MHz 286 FILE SERVER ARCNET PC TERMINALS LOADED SOFTWARE, CABLES TERMINATORS AND TEES EVERYTHING PLUG IN & TURN ON

4-USER (40MB)	$6,999 00
6-USER (80MB)	$8 999 00
8-USER (80MB)	$10 999 00

OPERATING SYSTEMS

NEW! ADV NETWARE 286 V 2 1 SFT	$2 599 00
ADV NETWARE 286 V 2 0A	$1 499 00
ADV NETWARE 286 SFT I	$2,096 50
ELS 4-USER SOFTWARE	$429 00

CARDS

ARCNET PC/XT	$169 00
ARCNET AT	345 00
ETHERNET	$259 00
ETHERLINK PLUS AT	$699 00
MICROCHANNEL CARDS PS/2	AVAILABLE

WORK STATIONS

ARCNET PC TERMINAL	$799 00
ETHERNET PC TERMINAL	$799 00

MISC NETWORKING ITEMS

ARCHIVE FT60 EXT TAPE BACKUP	$899 00
ADDTL CONT CARDS FOR ARCHIVE	199 00
MOUNTAIN 40MB TAPE BACKUP	$469 00
WANGTEK 60MB TAPE BACKUP (INT)	$549 00
ARCNET ACTIVE HUB	$499 00
ARCNET PASSIVE HUB	$85 00
ELGAR MONITOR 1000 WATT UPS W/SOFTWARE	$899 00
APC MONITOR 1000 WATT UPS	$1 199 00

CARDS

MULTI I/O	$69 99
MONOCHROME GRAPHICS W/PP	$69 85
ATD HERCULES COMPATIBLE W/PP	$95 00
TAXAN 535 MONOCHROME W/PP	$79 00
HERCULES GRAPHICS CARD PLUS	$179 00
IBM MONOCHROME W/PP	$197 00
COLOR GRAPHICS CARD	$89 00
COLOR GRAPHICS CARD W/PP	$89 00
HERCULES COLOR CARD W/PP	$146 00
NEW HERCULES INCOLOR CARD	$249 00
TAXAN 555 COLOR CARD W/PP	$189 50

EGA AND MEMORY CARDS

EPIC 480 EGA CGA, MDA HERC 640 X 480 VIDED 7 COMPATIBLE	$149 00
PARADISE AUTOSWITCH EGA 640 X 480	$199 00
QUADRAM EGA	$199 00
VIDED 7 VEGA DELUXE	$239 00
NEC GB-1 640 X 480 RES	$239 25
SPECIAL! NEW GENOA SUPER EGA HI-RES 800 x 600 RESOLUTION	$225 00
ATI WONDERBOARD EGA VGA CGA	$199 00
STB VGA EXTRA VGA EGA CGA MONO	$249 00
GENOA VGA 5100 800 X 600	SAVE
GENOA SUPER VGA 1024 X 768	SAVE
NEC MVA 1024	$829 00
NEC MVA 1024 ENHANCED	$1060 00
VIDED 7 VGA	$299 00
QUADRAM ULTRA VGA CARD	$339 00
ORCHID DESIGNER VGA	$309 00
PARADISE VGA CARD 640 X 480	$296 00
PARADISE VGA PROFESSIONAL	CALL
AST VGA CARD	$314 50
ATI VGA VIP CARD	$307 00

MODEMS

PACKARD BELL 2400 BAUD INTERNAL MDDEM W (PRO COM) SOFTWARE	$169 00
PACKARD BELL 2400 BAUD EXTERNAL	$199 00
ATO 300 1200 BAUD W/PCTALK III	$89 00
USR SPORTSTER 1200 EXTERNAL	$128 00
USR SPORTSTER 1200 HALF INTERNAL	$108 00
USR SPORTSTER 2400 INTERNAL W/SOFTWARE	$199 00
EVEREX 1200BAUD INTERNAL	$109 00
EVEREX 2400BAUD INTERNAL	$199 00
EVEREX 2400BAUD EXTERNAL	$289 00
NEW LOWER PRICING AVAILABLE	
HAYES SMARTMODEM 1200 EXTERNAL	$289 00
HAYES SM1200B W/SMARTCOM II	$289 00
HAYES SMARTMODEM 1200B W/HW INTERNAL - NO SOFTWARE	$250 00
HAYES SMARTMODEM 2400 EXTERNAL NO SOFTWARE	$424 00

FAX MACHINES

SHARP FO-300	$1 220 00
SHARP FO-500	$1 649 00
CANON FAXPHONE II	$999 00

HAYES SMARTMODEM 2400B W/SOFTWARE	$424 00
HAYES SMARTMODEM 2400B INTERNAL HARDWARE ONLY	$379 00
EXTERNAL MODEM CABLES	$15 00
IBM 5250 EMUL 2 12 CONV KIT	$633 75

PRINTERS W/ FREE CABLE

NEW IBM PRINTERS

IBM PROPRINTER II	$439 25
IBM PROPRINTER XL24	$779 30
IBM QUIETWRITER III PRINTER	$1 249 00
CITIZEN 120D 80 COL, 120 CPS	$169 00
CITIZEN 180D 80 COL 160 CPS	$178 00

SPECIAL OF THE MONTH

CITIZEN MSP40 80 COL 200 CPS	CALL
EPSON LX-800 W TRACTOR FEED	$219 00
EPSON FX-86E	$319 00
EPSON Fx-286E	$439 00
EPSON EX 800	$459 00
EPSON LD 500	$369 00
EPSON LD 850	$549 00
EPSON LD 1050	$785 00
EPSON LD 2500	$859 00
SPECIAL! NEC P2200	$339 00
NEC P660 80 COL	$425 00
NEC COLOR P660	$530 50
NEC P760 136 COL/216 CPS	$580 00
NEC COLOR P760	$699 00
NEC P560 XL	$879 00
NEC P960 XL	$1,035 00
NEC 3550 SPINWRITER	$719 00
NEC 8850 SPINWRITER	$1 039 00
PANASONIC 1080i	$199 00
PANASONIC 1091i	$219 00
PANASONIC KX-P1595	CALL
DESTINY LASER X1 H-P COMPAT 4 MONTHS FREE SERVICE W/TRW	$1,599 00
OKIDATA ML 182 PLUS FOR IBM	$243 49
OKIDATA ML192 PLUS FOR IBM	$329 00
OKIDATA ML193 PLUS FOR IBM	$440 00
OKIDATA ML292E	$377 44
OKIDATA ML293E	$515 50
INTERFACE MODULE FOR 292/293	$94 99
SPECIAL! OKIDATA ML393 P/SERIAL	$949 00
NEW! TOSHIBA P321 SL W/TRACTOR	$490 00
TOSHIBA P341 S/L	$634 00
TOSHIBA P351 SX W/TRACTOR	$995 00
HP LASERJET SERIES II	CALL
HP DESKJET INKJET PRINTER	$695 00
HP 7475A PLOTTER	IN STOCK

AUTHORIZED WYSE DEALER • ALL SOFTWARE MINIMUM 30% OFF • MOST ORDERS SHIPPED WITHIN 48 HOURS • WE HAVE THE LOWEST PRICE, CALL US BEFORE YOU BUY IT ANYWHERE ELSE • CORPORATE BIDS OR HIGH VOLUME BIDS WELCOME CALL (800) 426-2489, AND ASK FOR AMY
TECH HOT LINE (312) 537-3970 • TOLL FREE ORDER LINE (800)/426-2489
WE HAVE ALL YOUR COMPUTER NEEDS AT THE BEST PRICE AND WE GUARANTEE IT!

CALL 1-800-426-2489 **or in Illinois** 312-537-3600 **FAX:** (312) 537-2850

Prices reflect 2% cash discount. Allow 10 business days for shipping when paying by personal check Software, chips and other electronic components are not returnable Returns are subject to a restocking charge Prices are subject to change without notice

VISA MasterCard accepted

707 COMPUTER SALES 707 Dartmouth Drive Buffalo Grove, IL 60089

CIRCLE 106 ON READER SERVICE CARD

Low Prices, Fast Service.

Satisfaction Guaranteed! Since 1975

Turbo-XT
$398

- 4.77 & 8 MHz
- 640K Motherboard with 256K
- 8 slots • 8087 socket
- 150W power supply

Turbo-AT
$798

- 1 MB Motherboard with 640K
- 200 watt power supply
- AT-style keyboard
- One year warranty
- Clock/calendar

Option A
- High resolution amber monitor
- Hi-res graphics card — add
- Parallel printer port $148

Option B
- Hi-res RGB color monitor
- Hi-res graphics card — add
- Parallel printer port $298

Option C
- Hard disk drive
- Dual hard disk controller

30 MB for XT	40 MB For PC/XT/AT
add $298	add $498

intel Math Coprocessors

8087 $98	8087-2 $138
8087-1 $198	80287-6 $178
80287-8 $228	80287-10 $268
80387-16 $438	80387-20 $728

PC Mouse

LogiTech mouse	$78
Mouse systems mouse	$98
Microsoft mouse	$118
Genius mouse	$58
Fastrap trackball	$98
Deluxe joystick	$24

1200 Baud Deluxe Modem
$58

2400 baud ½ card internal	$128
1200 baud external	$88
2400 baud external	$168

30 MB Hard Disk
Complete kit with controller

CMS **$298**

20 MB PC/XT Kit	$248
20 MB Card	$398
40 MB for AT	$398
40 MB PC/XT Kit	$498
Mountain 40 MB Tape	$398

360K Disk Drive
Half height, IBM compatible Direct Drive

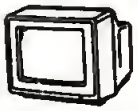
$68

Tandon TM100-2 full height

for IBM PC or XT	$118
1.2 MB for AT	$98
5¼" drive for PS/2	$268

3½" Disk Drive
720K....$98 1.44 MB....$128

VGA Package
Monitor & Card **$648**



- 800 x 560
- Up to 256K brillant colors

Hi-res EGA card 640x480	$128
EGA monitor 640x350	$378
NEC MultiSync II 640x560	$598
RGB color monitor 640x240	$258

Amdek 310A $98
Best selling hi-resolution non-glare amber monitor

EPSON 24 Pin
$369
LQ-500
List Price $529

EPSON Letter Quality Printers
LQ-850, LQ-1050, LQ-2500 .. Call

EPSON 9 Pin
$198
LX-800

EPSON Near Letter Quality
FX-86e, FX-286e, EX-800 .... Call

HP LaserJet II
$1698

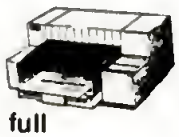
List Price $2595

HEWLETT PACKARD

Extra Toner Cartridge	$98
PDP 4 MB RAM card w/OK	$198

1 MB	2 MB	4 MB
$348	$648	$1148

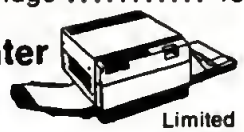
HP DeskJet
$748



List Price $995
300 x300 DPI with full with full page graphics

PDP 128K RAM	$98
Extra ink cartridge	$18

Laser Printer
$1198



Limited Quantity!

1.5 MB RAM card	$198
Toner cartridge	$58

No Slot Clock

$48

MICROSOFT.
MS-DOS 3.21..... $98

Place orders toll free!
Continental U.S.A. 1-800-421-5500
Inside California 1-800-262-1710
Fax machine 1-213-675-2522
All others 1-213-973-7707

JADE COMPUTER

4901 W. Rosecrans Ave. Box 5046
Hawthorne, California 90251-5046
CIRCLE 243 ON READER SERVICE CARD

Prices at our eight store locations will be higher on some items.

California
Torrance, Santa Ana, Woodland Hills
Kearny Mesa, Sunnyvale
Taxas
Addison, Houston
Georgia
Smyrna

MEMBER

We accept checks, credit cards or purchase orders from qualified firms and institutions. No surcharge on credit card orders. CA., TX. & GA. residents add sales tax. Prices & availability subject to change without notice. Shipping & handling charges via UPS ground 50¢/lb. UPS air $1.00/lb. Minimum charge $3.00.

VISA MasterCard AMERICAN EXPRESS

F&W Communications

F&W WORKSTATIONS - THE ADVANCED USER INTERFACE

THE COMPLEAT GRAPHIC ARTIST

We have the lowest prices in the world on 19-inch color monitors!

Hitachi CM3719 1024X800 . . . . . $990.00
State-of-the-art 1280X1024 Moniterm 19" color with 2048X2048 virtual display $1600.00
Mitsubishi 3919 with analog RGB inputs for TV, and TTL inputs for EGA and CGA $999.00
Philips 19" monochrome for publishing $400.00
True VGA (IBM 8514 emulation) 19" color Hitachi monitor. Fantastic! $1099.00
Ikegami 14" 16-color monitor for VGA. Rugged and super bright for mobile operation. Without ease $249.00
Many used 19" color monitors; from $499.00

F&W has all the equipment and software you need for truly professional publishing, TV editing, and drafting. We offer substantial discounts on all brands of equipment. The workstation at left shows:

Houston Instrument DMP 62 plotter: size to 36" X 48" . . . . . CALL
The monitor is a 19" Hitachi at $990.00
The digitizer is a Summagraphics 12" X 18" at $650.00
The console monitor is a Maganvox Multiscan at $540.00
The computer is a Wyse 386-based system at . . . . . CALL
The furniture is the French-built UNIC workstation at . . . . . CALL

Many other options are available:

CPU's with hard disks $999.00
Sweet-P plotter (HP 7475A compatible 6-pen) $749.00
Digitizers from $340.00
Microtek MSF-300G Flatbed Scanner. 300dpi resolution; 256 shade grayscale reproduction $2750.00
Blaser 2: full range graphics laser printer; excellent blacks . . $1650.00
Mural Flatbed Plotter; D-size plots at minimum cost $2195.00

Shown at right is our most exciting new product, the Vision Systems "Vision 16" frame grabber. This hardware and software system captures TV images from a camera, VCR, or camcorder. Because of its 512X480 pixel display, with 16 bits per pixel, extraordinary color rendition and clarity can be achieved. Conversion programs are available for VGA, CGA, and EGA. The "Vision 16" system lists for $1795 . . . . . CALL

State-Of-The-Art CRT controller cards from F& W ensure system compatibility:

Video 7 VGA, 640X480, 256 color $249.00
QDP 1000/16, 16 color, 1024X1024 . . . . $649.00
QDP 256 color $1249.00
Imagraph 1280X1024 with 1 Meg Videoram, 16 color $1200.00

ALL MAJOR CREDIT CARDS ACCEPTED

FARADAY & WHEATSTONE COMMUNICATIONS
CAD, GRAPHICS & ELECTRONIC PUBLISHING
194 MAIN STREET, MARLBOROUGH MA 01752 USA (617) 485-1144

CIRCLE 391 ON READER SERVICE CARD

JDR Microdevices®

Complete customer satisfaction...superior service...friendly, knowledgeable personnel quality merchandise...providing the best values in leading edge technology.

PROMETHEUS 2400 BAUD MODEM $129.95

NEW LOW PRICE!

IT'S TIME TO TRADE UP NOW THAT JDR BREAKS THE PRICE BARRIER ON 2400 BAUD MODEMS

- AUTO DIAL ANSWER
- SELF TEST ON POWER UP
- TOUCHTONE OR PULSE DIALING
- HAYES & BELL SYSTEMS COMPATIBLE
- FULL OR HALF DUPLEX
- MIRROR II COMMUNICATIONS SOFTWARE INCLUDED

MCT-24I
MCT-12I 1200 BAUD 1/2 CARD $ 69.95

EXTERNAL MODEMS

MCT-12E 1200 BAUD	$ 99.95
MCT-24E 2400 BAUD	$169.95

IBM COMPATIBLE KEYBOARDS

FULL ONE YEAR WARRANTY

IBM ENHANCED STYLE LAYOUT $79.95

- AUTOSENSE FOR XT OR AT COMPATIBLES
- LED INDICATORS • AUTO REPEAT FEATURE
- SEPARATE CURSOR PAD

MCT-5339

IBM AT STYLE LAYOUT $89.95

- SOFTWARE AUTOSENSE FOR XT OR AT COMPATIBLES
- LED INDICATORS • AUTO REPEAT FEATURE

MCT-5060

MAXI-SWITCH KEYBOARDS

ENHANCED STYLE LAYOUT $84.95

- STANDARD ENHANCED KEYBOARD LAYOUT
- TACTILE FEEDBACK
- LIGHTED NUM CAPS AND SCROLL LOCK
- NUMERIC & CURSOR KEYPADS 12 "F" KEYS

MAX-5339
MAX-5060 MAXI-SWITCH, AT STYLE $64.95

DIABLO PRINTER $279.95

- LETTER QUALITY AT 20 CPS 132 COLS
- 10 12 15 PITCH & PROPORTIONAL SPACING
- SERIAL & PARALLEL INTERFACE
- AUTO PAPER LOAD FRICTION FEED
- FULL XEROX WARRANTY

CENTRONICS LASER PRINTER $1195

NEAR TYPESET QUALITY
AFFORDABLE AT LAST

- 8 PAGES PER MINUTE • 300 DPI RESOLUTION
- 1 YEAR WARRANTY • CHOICE OF EMULATION BOARDS

MULTI-PRINTER EMULATION BOARD:
EPSON FX-80 EMULATION—NOTHING ELSE REQUIRED
IBM PC GRAPHICS PROPRINTER & DIABLO 630 EMULATION REQUIRES ADDITIONAL FONT CARD

HP LJ+ EMULATION BOARD:
2 PITCHES ADDITIONAL FONT CARD AVAILABLE

1.5MB RAM CARD	$139.95
EXTRA FONT CARDS	$199.95
TONER CARTRIDGES	$59.95
PFS FIRST PUBLISHER	$99.95

- **1 YEAR WARRANTY ON MCT PRODUCTS**
- **30 DAY MONEY BACK GUARANTEE**
- **TOLL-FREE TECH SUPPORT**
- **NO CREDIT CARD SURCHARGE**

SAMSUNG MONOCHROME MONITOR $129.95

- IBM COMPATIBLE TTL INPUT
- 12 NON GLARE LOW DISTORTION AMBER SCREEN
- 720 X 350 RESOLUTION
- SWIVEL BASE

NEC MULTISYNC $599.95

- ORIGINAL CGA EGA PGA COMPATIBLE MONITOR
- AUTO FREQUENCY ADJUSTMENT
- RESOLUTION AS HIGH AS 800 X 560

CASPER EGA $399.95

- 15 75 21 85 KHz SCANNING FREQUENCIES
- 640 X 200 350 RESOLUTION • .31 MM DOT PITCH
- 14 BLACK MATRIX SCREEN • 16 COLORS

CASPER RGB $279.95

- COLOR GREEN AMBER SWITCH • 39MM DOT PITCH
- 640 X 240 RESOLUTION • 14" NON GLARE SCREEN
- RGB IBM COMPATIBLE • CABLE INCLUDED

SAKATA MONOCHROME $69.95

- IBM COMPATIBLE TTL INPUT
- 12" NON-GLARE SCREEN
- CABLE FOR IBM PC INCLUDED

MONITOR STANDS

MODEL MS-100 $12.95

- TILTS AND SWIVELS
- STURDY PLASTIC CONSTRUCTION

MODEL MS-200 $39.95

- TILTS AND SWIVELS • BUILT-IN SURGE SUPRESSOR
- INDEPENDENTLY CONTROLS UP TO 5 AC OUTLETS

LOGITECH MOUSE $79.95

PC MAGAZINE'S EDITORS CHOICE
ALL MODELS HAVE SERIAL SUPPORT (COM1 COM2) 200 DPI RESOLUTION LOTUS 1-2-3 SHELL SELF INSTALLING SOFTWARE AND POINT EDITOR

SERIAL MOUSE W/PC PAINTBRUSH	$99.95
BUS MOUSE W/PC PAINTBRUSH	$99.95
BUS MOUSE W/PC PAINTBRUSH/CAD	$149.95

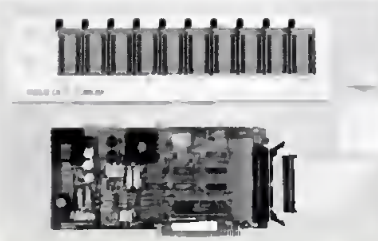
EPROM PROGRAMMER $129.95

PROGRAMS 27XX & 27XXX EPROMS UP TO 27512

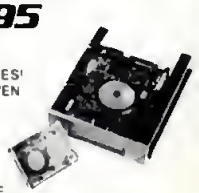
- SUPPORTS VARIOUS PROGRAMMING FORMATS AND VOLTAGES
- SPLIT OR COMBINE CONTENTS OF SEVERAL EPROMS OF DIFFERENT SIZES
- READ WRITE COPY ERASE CHECK AND VERIFY
- SOFTWARE FOR HEX AND INTEL HEX FORMATS

MCT-EPROM

MCT-EPROM-4	**4 GANG PROGRAMMER**	$189.00
MCT-EPROM-10	**10 GANG PROGRAMMER**	$299.95
MCT-PAL	**PAL PROGRAMMER**	$269.95
MCT-MP	**PROCESSOR PROG.**	$199.95



ARCHIVE XL TAPE BACK-UP $369.95



BACK UP 40 MB IN 40 MINUTES!

- EASY TO-USE MENU DRIVEN SOFTWARE
- USES STANDARD OIC DATA FORMAT
- FULL & INCREMENTAL BACK UP
- PARTIAL & FULL RESTORE

AR 5240 XT —FOR XT'S & AT'S
AR 5540 AT —AT'S ONLY 2X FASTER
TAPE NOT INCLUDED
TAPE CARTRIDGE—40 MB $24.95

JDR Microdevices and the JDR Microdevices logo are registered trademarks of JDR Microdevices. IBM, AT, PS/2 are trademarks of International Business Machines.

Seagate

60 MB NOW $499.00

WAS $649 AN INCREDIBLE PRICE REDUCTION! SAVE $150 AND GET MORE MEGABYTES PER DOLLAR THAN EVER BEFORE. THE ST-277 IS AN RLL DRIVE WITH A FAST 40 MS ACCESS TIME!
ST-277

WITH MCT-RLL CONTROLLER	$549.00
WITH MCT-AT/FH CONTROLLER	$639.00

1/2 HEIGHT DRIVES

20 MB, 65 MS, ST-225	**$225.00**
WITH MCT-HDC CONTROLLER	$269.00
WITH MCT-ATFH CONTROLLER	$339.00
30 MB RLL, 65 MS, ST-238	**$249.00**
WITH MCT-RLL CONTROLLER	$299.00
WITH MCT-ATFH-RLL CONTROLLER	$389.00
40 MB, 40 MS, ST-251	**$429.00**
WITH MCT-HDC CONTROLLER	$469.00
WITH MCT-ATFH CONTROLLER	$539.00

FULL HEIGHT DRIVES

30 MB, 40 MS, ST-4038	$559.00
80 MB, 28 MS, ST-4096	$895.00

1/2 HEIGHT FLOPPY DISK DRIVES

5¼" TEAC FD-55B DS/DD 360K	$99.95
5¼" TEAC FD-55G DS/HD 1.2M	$129.95
5¼" FUJITSU M2551A DS/DD 360K	$85.95
5¼" FUJITSU M2553K DS/HD 1.2M	$115.95
5¼" DS/DD 360K	$85.95
5¼" DS/HD 1.2M	$109.95
3½" MITSUBISHI DS/DD (AT OR XT)	$129.95

EGA SPECIAL

SAVE $50. BUY AN MCT-EGA CARD AND CASPER EGA MONITOR FOR JUST $499

20MB HARD DISK ON A CARD $349

- SAVES SPACE AND REDUCES POWER CONSUMPTION
- IDEAL FOR PC'S WITH FULL HEIGHT FLOPPIES

INTERFACE CARDS FROM MODULAR CIRCUIT TECHNOLOGY

MONOCHROME GRAPHICS CARD $59.95
TRUE HERCULES COMPATIBILITY. SUPPORTS LOTUS 123
- PARALLEL PRINTER PORT CONFIDURES AS CPT1 OR LPT2
- USES VLSI CHIPS TO ENSURE RELIABILITY

MCT-MGP

ENHANCED GRAPHICS ADAPTOR $149.95
100% IBM COMPATIBLE. PASSES IBM EGA DIAGNOSTICS
- 256K OF VIDEO RAM ALLOWS 640 X 350 IN 16 OF 64 COLORS
- COMPATIBLE WITH COLOR AND MONOCHROME ADAPTORS

MCT-EGA

COLOR GRAPHICS ADAPTOR $49.95
COMPATIBLE WITH IBM GRAPHICS STANDARDS
- SUPPORTS RGB, COLOR 6 COMPOSITE MONOCHROME
- 640 320 X 200 RESOLUTION. LIDHT PEN INTERFACE

MCT-CG

MONOGRAPHICS MULTI I/O $119.75
TOTAL SYSTEM CONTROL FROM A SINGLE SLOT!
- CTRL 2 FLOPPY'S, SERIAL, PARALLEL, GAME PORT, CLOCK CAL
- RUN COLOR GRAPHICS SOFTWARE ON A MONOCHROME MONITOR

MCT-MGMIO

MULTI I/O FLOPPY CONTROLLER $79.95
A PERFECT COMPANION FOR OUR MOTHERBOARDS
- SUPPORTS UP TO 2 360K FLOPPIES, 720K WITH DOS 3.2
- SERIAL, PARALLEL, GAME PORT, CLOCK CALENDAR

MCT-MIO
MIO-SERIAL—2ND SERIAL PORT $15.95

MULTI I/O CARD $59.95
USE WITH MCT FH FOR A MINIMUM OF SLOTS USED
- SERIAL PORT, CLOCK CALENDAR WITH BATTERY BACK-UP
- PARALLEL PRINTER PORT ADDRESSABLE AS LPT1 OR LPT2

MCT-IO

AT MULTIFUNCTION CARD $139.95
ADDS UP TO 3 MB OF RAM TO YOUR AT
- USER EXPANDABLE TO 1.6 MB OR 3 MB WITH OPTIONAL PIGGYBACK BOARD (0 K INSTALLED)
- INCLUDES SERIAL AND PARALLEL PORT

MCT-ATMF-MC PIGGYBACK BOARD $29.95
ATMF SERIAL-2ND SERIAL PORT $24.95

AT MULTI I/O CARD $59.95
USE WITH MCT ATFH FOR MINIMUM OF SLOTS USED
- SERIAL, PARALLEL AND GAME PORTS
- USES 16450 SERIAL SUPPORT CHIPS FOR HIDH SPEED DPS

MCT-ATIO
ATIO-SERIAL—2ND SERIAL PORT $24.95

576K RAM CARD $59.95
A CONTIGUOUS MEMORY SOLUTION IN A SHORT SLOT
- USER SELECTABLE CONFIDURATION UP TO 576K
- USES 64K & 256K RAM CHIPS (ZERO K INSTALLED)

MCT-RAM

EXPANDED MEMORY CARD $129.95
2 MB OF LOTUS INTEL MICROSOFT COMPATIBLE MEMORY FOR AN XT
- CONFORMS TO LOTUS INTEL EMS
- USER EXPANDABLE TO 2 MB
- CAN BE USED AS EXPANDED OR CONVENTIONAL MEMORY, RAMDISK AND SPOOLER

MCT-EMS
MCT-ATEMS AT COMPATIBLE VERSION $139.95

RLL DISK CONTROLLER $119.95
RLL HARD DISK CONTROL FOR YOUR XT COMPATIBLE
- SUPPORTS UP TO TWO RLL HARD DRIVES
- IMPROVES DATA STORAGE SPEED AND EFFICIENCY

MCT-RLL

ATFH CONTROLLER $149.95
FLOPPY HARD DISK CONTROL IN A TRUE AT DESIDN
- SUPPORTS UP TO 2 360K 720K 1.2MB FDD'S AS WELL AS 2 HDD'S USING STANDARD CONTROL TABLES

MCT-ATFH

INBOARD 386/PC $895.00

UPGRADE YOUR XT TO A 386 FOR LESS THAN $1000
- 16 MHZ PROCESSOR REPLACES 8086
- 1 MB INSTALLED
- EXPAND TO 3MB WITH PIGGYBACK CARD
- 5 YR WARRANTY

INBOARD 386 AT	$1199.95
ABOVE BOARD PS 286	$399.95
ABOVE BOARD 286	$369.95

Build A System

OVER 20,000 JDR SYSTEMS HAVE ALREADY BEEN BUILT. EASY TO ASSEMBLE IN JUST 2 HOURS WITH A SCREWDRIVER. SAVE MONEY AND LEARN ABOUT YOUR COMPUTER AT THE SAME TIME.

12 MHz AT COMPATIBLE $1034.20
INCLUDES: 12 MHZ BABY AT MOTHERBOARD, 256K RAM MEMORY, MINI-AT CASE W/POWER SUPPLY, AT STYLE KEYBOARD, 1.2 MB FLOPPY DRIVE, FLOPPY/HARD DRIVE CONTROLLER, MONOCHROME MONITOR, GRAPHICS ADAPTOR

10 MHz XT COMPATIBLE SYSTEM $599.00
INCLUDES: MOTHERBOARD, 256K RAM MEMORY, 135 WATT POWER SUPPLY, FLIP-TOP CASE, AT STYLE KEYBOARD, 360K FLOPPY DRIVE, MONOGRAPHICS I/O CARD, MONOCHROME MONITOR, SERIAL PORT, 2 PARALLEL PORTS, CLOCK/CALENDAR AND GAME ADAPTOR. RUNS COLOR DRAPHICS ON A MONOCHROME MONITOR

16 MHz 1 MB 386 SYSTEM $2298.65
INCLUDES: MYLEX 386 MDTHERBOARD, 1 MB RAM ON BOARD, 200 WATT POWER SUPPLY, AT STYLE CASE, ENHANCED AT STYLE KEYBOARD, 1.2 MB FLOPPY DRIVE, AT FLOPPY/HARD CONTROLLER, MONOCHROME MONITOR, MONOGRAPHICS CARD

MOTHERBOARDS

10 MHz SINGLE CHIP XT $129.95
Landmark AT speed 4.1 MHz . Norton SI 2.1
- SINGLE CHIP USES LESS POWER, IMPROVES RELIABILITY
- KEYBOARD SELECTABLE SPEED, 4.77 MHz OR 10 MHz
- RESET SWITCH, KEYLOCK AND SPEED/POWER INDICATORS SUPPORTED

MCT-TURBO-10

80286 6/8 MHz $379.95
Landmark AT speed 8.0 MHz . Norton SI 7.7
- 8 SLOTS (2 8-BIT, 6 16-BIT) AT MOTHERBOARD
- HARDWARE SELECTION OF 6/8 MHZ, 1 WAIT STATE
- KEYLOCK SUPPORTED, RESET SWITCH, FRONT PANEL LED INDICATOR
- SOCKETS FOR 1 MB OF RAM AND 80287

MCT-ATMB

12 MHz MINI 80286 $399.95
Landmark AT speed 13.2 MHz . Norton SI 11.6
- 6 MHz, 10 MHz (0/1 WAIT STATE), 12 MHz (1 WAIT STATE)
- SUPPORTS 256K - 1024K MEMORY
- RE-CHARGEABLE HIDH CAPACITY NI-CAD BATTERY
- 6 16-BIT SLOTS, 2 8-BIT SLOTS
- MOUNTS IN STANDARD XT CASE

MCT-BATMB-12
MCT-BATMB 6/10 MHZ MINI 80286 BOARD $389.95

16 MHz MYLEX 80386 $1649.00
Landmark AT speed 24.0 MHz . Norton SI 18.0
- 1 MB RAM ON BOARD, 4 MB VERSION AVAILABLE (NON-USER UPGRADEABLE)
- 8 SLOTS, 2 8-BIT, 6 16-BIT
- SUPPORTS 80287 MATH CO-PROCESSOR
- SUPPORTS 80387 W/ADAPTOR CARD ($149.95)
- 64 KB CACHE FOR NEAR 0 WAIT STATE

MCT-386MB

MCT-386MB20 20 MHz VERSION, 1 MB $2249.00
Landmark AT speed 30.9 MHz Norton SI 23.0

VISA MasterCard

JDR MICRODEVICES, 110 KNOWLES DRIVE, LOS GATOS, CA 95030
LOCAL (408) 866-6200 FAX (408) 378-8927 TELEX 171-110

RETAIL STORE: 1256 SOUTH BASCOM AVE., SAN JOSE, CA (408) 947-8881
HOURS: M-F 10-7 SAT. 9-5 SUN. 12-4

Terms: Minimum order $10.00. For shipping and handling include $2.50 for UPS ground and $3.50 UPS air. Orders over 15 lb. and foreign orders may require additional shipping charges - please contact the sales department for the amount. CA residents must include applicable sales tax. Prices are subject to change without notice. We are not responsible for typographical errors. We reserve the right to limit quantities and to substitute manufacturer. All merchandise subject to prior sale. A full copy of our terms is available upon request. Items pictured may only be representative.

ORDER TOLL FREE 800-538-5000

COPYRIGHT 1988 JDR MICRODEVICES

CIRCLE 108 ON READER SERVICE CARD

CONTINENTAL U.S. AND CANADA

BUS Computer Systems, Inc.

Terribly Fast

30-DAY MONEY BACK
OPEN 7 DAYS

Wire Transfer | Money Order

VISA | MasterCard | AMERICAN EXPRESS

Los Angeles
6951 Warner St., Suite 298
Huntington Beach, CA 92647
1-800-451-5279

New York
135 W. 26th St., 8th Fl.
New York, NY 10001
212-627-4485

Atlanta
3231 E. Memorial Drive, Suite 200
Stone Mountain, GA 30083
1-800-451-5279

Boston
30 Prince St.
Brookline, MA 02116
1-800-451-5279

Wire Transfer
Chemical Bank
305 Seventh Ave., NY, NY 10001
For the Acct. of BUS Computer Systems, Inc.
Acct. #021 030139

FAX: (212) 627-9881
TLX: 3712681 BUS
TECH HELP: (212) 627-9872

IBM, XT, AT are registered trademarks of International Business Machines, Inc. Hercules is a registered trademark of Hercules, Inc. COMPAQ is a registered trademark of COMPAQ Computer, Inc.

BUS 88

640K 8 MHz
10 MHz Optional

BEST BUY

Fully IBM® Compatible

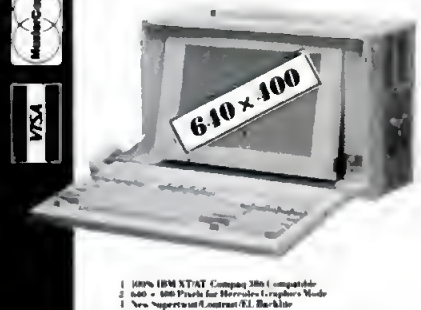
Phoenix BIOS

$650

1. 100% IBM XT-Compatible w/640K RAM on Board
2. Phoenix or AMI BIOS Installed
3. One 12" High-Res. Amber Monitor (720 x 348)
4. Hercules Graphics Emulation Card
5. Intel 16-Bit 8088-2 Running at 4.77/8 0MHz
6. 10MHz Systems w/Intel 8088-1 Optional
7. Two DS/DD 360K Half-Height Diskette Drives
8. 83 Fully IBM Compatible 83 Expansion Slots Accept All IBM Peripherals
9. Runs All MS-DOS Programs Including 1-2-3, Flight Simulator, dBase III Plus, Autocad, WordStar, WordPerfect, etc.
10. Operates MS-DOS, PC-DOS, CP/M Base, Xenix, Venix
11. Keyboard Selectable 4.77 and 8 0MHz
12. 150 Watts 110/220 VAC Power Supply w/Four Cables
13. Keyboard w/LED's, Enlarged Return/Shift Keys and 88 Keys
14. Multi I/O Card: Controls Two Floppy Drives w/Printer Port/Game Port/Serial Port and an Optional 2nd Serial Port/Light Pen Port/Battery Backuped Real Time/Calendar
15. 8087 Math Co-Processor Socket Installed on Board
16. 8 EPROM Sockets Also Installed on Board
17. Power-On Self-Testing of System Components
18. Nickel-Plated, Enamel Coating, Heavy-Duty Metal Case w/Four Drive Slots and Speaker
19. Six Slots Still Available after Systems Configurations
20. Ready for 10/20/30/40/85MB Hard Disk Installations
21. Ready for Network/Multiuser Installations
22. Ready for Mouse/Joystick Interface
23. Fully Set Up and Diagnostically Tested
24. Operating Manuals for Monitor, Keyboard, Motherboard, Multi Card, Multi I/O Card and the Operator
25. 30-Day Money Back Guarantee
26. One-Year Fully Warranteed Labor and Parts
27. 72 Hour Burn-In Period
28. Ready for Immediate Delivery
29. Ship Worldwide via Federal Express, DHL, UPS or Air Cargo, Door-to-Door in Most Cases
30. Accept Overseas Telephone Orders w/VISA/MasterCard or Wire Transfers

88 8 88 s /20MB A One Floppy
Seagate ST-225, 65MB **$900**

BUS LCDs



1. 100% IBM XT/AT Compaq 386 Compatible
2. 640 x 400 Pixels for Hercules Graphics Mode
3. New Supertwist Contrast/EL Backlite
4. 80 Characters x 25 Lines
5. Dot Size: 0.33mm W x 0.33mm H x 0.0 6mm Spacing
6. Crystal Blue Dots on White Background, Reverse Mode Not Available
7. 84 Keys w/Clicking Feel and Enlarged Return/Shift Keys
8. 180 Watts 110/220 Volts Autoswitching
9. Built-In Line Filter and Cooling Fan
10. Power-Voltage Over-Current and Short-Circuit Protection
11. Operates MS-DOS, PC-DOS, OS/2 and Unix
12. 190mmW x 254mmH x 190mmD
13. 7.5kg/16.5lbs (net) All Form
14. Real-Time Clock w/Battery Backup, Built-In Speaker
15. Can Be Connected to Color/EGA Monitor Network, etc.
16. Two 3½" Drive Slots Available

BUS 00 LCD	**$1250**
Configured Same as 88 8 88 s/Two 360K s/20MB Seagate ST-225, 65MB, One 360K	1650
BUS 088 LCD	**1950**
Configured Same as 88 8 286 s/One 1.2MB s/20MB Seagate ST-225, 65MB, One 1.2MB	2200
Bus 388 LCD	**$ 100**
Configured Same as 88 8 386 s/One 1.2MB s/43MB Seagate ST-251, 39MB, One 1.2MB	$2350

BUS Portable EGA

1. 9" High-Res. (720 x 348) Dual Frequency Amber EGA Monitor Accepts Both Mono and Color Card
2. Three Half-Height Drive Slots
3. Reinforced Aluminum Frame
4. 200 Watts 110/220 VAC Power Supply
5. 7 Expansion Slots Available
6. 84 Keys w/LEDs for Caps, Num and Scroll Lock
7. Enlarged Return and Shift Keys
8. Mechanical Seventeen-Inch of Clicking Feel w/A Positive Tactile Feedback
9. Power Lock Key Installed
10. Contrast-Adjusting Knob Installed
11. Brightness-Adjusting Knob Installed
12. Turbo Speed Light Indicator Installed
13. Hardware Reset Button Installed
14. Dimensions: 44mmW x 254mmH x 457mm(Hor 17.9" x 8.2" x 16.9"
15. Weighs 30kg (32 lbs. (net) All Form
16. EGA Particulars Available Now
   —9" EGA Monitor w/640 x 350 EGA or 640 x 200 CGA
   —230 Watts 110/220 VAC Power Supply
   —Dot Pitch 0.28

BUS 00 Portables	**$1050**
Configured Same as 00 8 88 s/Two 360K s/20MB Seagate ST-225, 65MB, One 360K	1350
BUS 088 Portables	**1650**
Configured Same as 88 8 286 s/One 1.2MB s/20MB Seagate ST-225, 65MB, One Floppy	1900
BUS 388 Portables	**2200**
Configured Same as 88 8 386 s/One 1.2MB s/43MB Seagate ST-251, 39MB, One Floppy	2300
	3100
	3700
	4900

Price subject to change without notice.

BUS 286

10 MHz "0" Wait
12 MHz/16 MHz Optional

BEST BUY

Fully IBM® Compatible

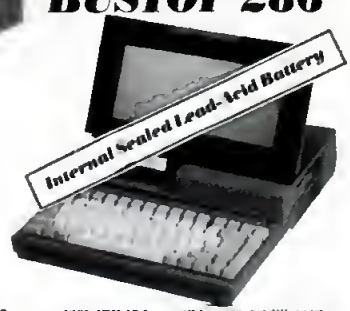
Phoenix BIOS

$1100

1. 100% IBM AT-Compatible. Accepts All IBM Peripherals
2. Fully Compatible Phoenix BIOS Installed
3. Intel 80286-10 Running at 10 MHz "0" Wait
4. Optional 16MHz 80-Nanosecond RAM w/84 s 17.6
5. 640K RAM on Board
6. Memory Expandable to 16MB w/Add-On Memory Cards
7. One 12" High-Res. Screen Board Amber Monitor (720 x 348)
8. Hercules Graphics Emulation Card w/Printer Port
9. Runs All MS-DOS Programs Including 1-2-3, Flight Simulator, dBase III Plus, Auto-pol, WordStar, etc.
10. Operates MS-DOS, PC-DOS, CP/M Base, Xenix, Unix
11. 8 Expansion Slots, Six 16-Bit/Two 8-Bit
12. One Western Digital WD1003-WA2 Combined Hard-Disk/Floppy-Disk Controller Controls Two Hard Disks and Two Floppies
13. Enhanced Keyboard w/LEDs, Enlarged Return/Shift Keys
14. 200 Watts 110/220 VAC Power Supply w/Four Cables
15. Hardware Reset Tied to Bottom Installed
16. One 1.2MB Half-Height High-Density FD
17. Optional 3½" 360K or 3½" 1.44MB Floppy
18. Real-Time Clock w/Battery-Backed CMOS Memory for System Configuration Data
19. One RS-232 Serial Card w/2nd Port Optional
20. Power-On Self-Testing of System Components
21. 80287 Math Co-Processor Socket Installed on Board
22. Nickel-Plated, Enamel Coating, Heavy-Duty Lockable Case
23. Five Drive Slots Available w/Speaker Installed
24. Four Slots Available after Systems Configuration
25. Power/Hard-Disk Turbo Indicator Light Installed
26. Ready for OS/2 Systems Operations
27. Ready for 20/30/40/45/84/103/120/140MB Hard-Disk Systems
28. Ready for 20/40/60/90MB Tape Backup Installation
29. Ready for Network/Multiuser/Multitasking Interface
30. Ready for Mouse/Joystick Interface
31. Fully Set Up and Diagnostically Tested in America
32. Operating Manuals for Monitor, Keyboard, Motherboard, MCP Card, Serial Card and the Operator
33. 30-Day Money Back Guarantee
34. 20-Month Fully Warranteed Labor and Parts
35. 72 Hour Burn-In Period
36. Ready for Immediate Delivery
37. Ship Worldwide via Federal Express, DHL, UPS or Air Cargo, Door-to-Door in Most Cases
38. Accept Overseas Telephone Orders w/VISA/MasterCard or Wire Transfers

80 8 286 s /20MB, Seagate ST-225, 65MB	**$1150**
BUS 286 s/20MB, Seagate ST-225, 65MB	**1500**
BUS 286 s/42MB, Seagate ST-251, 39MB	**1700**
BUS 286 s/84MB, Seagate ST-4096, 80MB	**2400**

BUSTOP 286



1. 100% IBM AT-Compatible. Accepts All IBM Peripherals on Board Up to 2MB. Operates MS-DOS, PC-DOS, OS/2, Unix, Xenix, Flight Simulator, dBase III Plus, Autocad, WordStar, WordPerfect, etc.
2. 12/8 MHz Intel 80286 Microprocessor Running at 0 Wait States
3. Internal Sealed Lead-Acid Battery Powers Clock/Calendar, Memory and Hard Disk for Up to 4 Hours
4. Optional 80287-10 Math Co-Processor Socket Installed
5. Keyboard Selectable 8 MHz/16 MHz Operation
6. Phoenix BIOS Installed
7. 640K RAM Installed on Board
8. Memory Expandable to 16MB on Board
9. Two Serial Ports, One Parallel Port Installed
10. One 1.2MB 5¼" Floppy Disk Drive Installed
11. Hardware Reset Button Installed
12. Turbo Speed Light Indicator Installed
13. Real-Time Clock/Calendar with Battery Backup Installed
14. Battery Backup Will Run Clock/Calendar, Memory and Hard Disk for Up to 4 Hours
15. Battery Backup Will Run Clock/Calendar and Memory for Up to 24 Hours
16. Battery Backup Will Run Clock/Calendar for Up to 48 Hours
17. Battery Backup Will Run Clock/Calendar for Up to 72 Hours
18. Battery Backup Will Run Clock/Calendar for Up to

SAVE 50% or more with our National Computer Ribbons™ brand products.

NATIONWIDE
1-800-292-6272

MARYLAND
1-800-442-6272

MARYLAND LOCAL
561-0200

VISA MasterCard

All of our ribbons are manufacturad to axcaad your original aquipment manufacturars specifications.

NATIONAL COMPUTER RIBBONS™

9566 Deereco Road • Timonium, Maryland 21093

NCRC GUARANTEE

We will never knowingly disappoint you. If for any reason your purchase does not give you complete satisfaction the full purchase price will be cheerfully refunded immediately upon return of the merchandise.

We have always believed that no sale is complete until the customer has received total satisfaction from our products.

Philip E. Berringer President

QUALITY SERVICE PRICING

BUY DIRECT FROM THE MANUFACTURER

STOP THROWING AWAY YOUR DOLLARS

$ $ $

We manufactura our products with tha finast matrix inks, pramium high dansity nylon, pracision angineerad plastics and "Rem" air refrigeratad loading equipmant.

COLORS . . . BLUE — GREEN — PURPLE — RED (Add $1.00 To Each Price)
Nylon Only

CARTRIDGE RIBBONS (NYLON)

No.	Description	Price (ea.)
289	Alps 2000	$4.50
050	Anadax 9500/9600	3.60
180	Appia Imegawriter II 4 color	9.95
114	Appla Imagewritar/DMP	2.95
102	Brother M1409	4.50
127	Brothar M1509/1709	5.50
131D	Burroughs B-9246-3/8	4.95
104	Canen A-1200	4.50
113	Cantronics 150/152	2.25
109	Centronics 350/351/352/353	8.50
112	Cantronica 704/705/753	4.50
118	Citizan LSP 120D	4.50
189	Citizan MSP 10/20	2.50
187	Citizen MSP 15/25	3.50
123	Comrex 420	6.90
114	C. Itoh 1550/7500/8510	2.95
120	Data General LP2	5.75
130	Data Products M-100L/120/200	3.50
131D	Data Products B-300/600	4.95
137	Data Products B-900/1000	6.50
135	Data Royal 5000	2.80
990	Datatrol/LRC MP40	4.15
135	Data South 180/220/5180	2.80
180	Dec LA 34/100/210 Letterprinter	2.95
114	Dec LA 50	2.95
156	Diablo 1660/2300 Matrix	3.50
153	Diablo Hytype II Nylon	2.95
280	Epson EX 800/1000	4.20
165	Epson FX/MX/RX 70/80/85	2.50
187	Epson FX/MX/RX 100/185/286	3.50
288	Epson Lq 800/Lq 850 H.D.	3.50
289	Epson Lq 1000 H.D.	4.50
163	Epson Lq 1500	2.95
281	Epson Lq 2500 H.D.	4.50
175	Epson LX 80/90	2.50
226	Facit 2301/4512/4514	2.95
133	Facit 4500/4510/4511/4513	3.75
135	Facit 4520/4525/4526/4528	2.80
991	Fujitsu DMPG 9/DX2100-2200	3.95
171	Ganaral Elactric 300/341/W/I	35.00
146	Hewlett Packard 2608	18.65
145	Hewlett Packerd 2631A	10.95
231	Honeywall 1500/7023/9104 G.P.	2.50
181	IBM 3287/3615 Sil.Dol.Cup/Loop	$1.80
195	IBM 3287/3619 Silver Dol. Cart.	2.50
182	IBM 3288 1/2" Harmonica	3.00
185	IBM 3776 3/4" Harmonica	3.50
188	IBM 4201 ProPrinter II	3.75
176	IBM 4202 ProPrinter XL	4.50
177	IBM 4207 ProPrinter X24	4.95
211	IBM 4208 ProPrintar XL24	5.95
198	IBM 5224 Baseball Bat	13.95
178	IDS Prism Black 132/2080/2132	3.50
178A	IDS Prism Primary RD/BL/GR/B	9.75
178B	IDS Prism Process CY/MA/Y/BL	9.75
286	Mannesmann Tally 85	3.95
285	Mannasmann Tally 86	4.50
233	MannesmannTally1000/1200/1600	2.75
204	Mannasmann Tally 100/120/160	3.00
205	Mannesmann Tally 130/140/180	3.50
200	NEC 5500/7700 Nylon Cart.	2.45
114	NEC 8023 PC/8024 PC/8027 PC	2.95
660	NEC Pinwritar P1/P2/P6	3.60
661	NEC Pinwriter P3/P7	3.95
662	NEC Pinwriter P5 H.D.	3.95
663	NEC P2200 H.D.	5.50
209	Okideta 182/183/192/193	3.95
206	Okidata 292	4.85
208	Okidata 293/294	5.60
217	Panasonic KXP 1080/1091/1093	6.90
226	Radio Shack DMP 400/LPVI	2.95
235	RadioShackDMP100/LPVII/TRS80LPII	3.95
282	Radio Shack/DMP 130	3.75
282	Seikosha SP800/1000	3.75
261	Star Micronics NB/NL/NP/NX 10	3.60
264	Star Micronics NL/NP/NX 15	5.20
266	Star Micronics NX1000	4.95
262	Star Micronics Radix 10/SR 10	3.60
263	Star Micronics Redix 15/SR15	4.10
290	Star Micronics SD10	3.75
291	Star Micronics SD15	4.10
135	Talex 287D/287D2	2.60
242	Texas Instruments 850/855	3.10
243	Texas Instruments 660/865	3.20
245	Toshiba P321/P341/P351	3.10
245	Toshiba P1340/P1350/P1351	3.10
135	Tritel	2.80
131D	Univac 0789/0790	4.95

CARTRIDGE RIBBONS - FILM
(correctabla / multi-strika)

306-	Brothar EM60/100/200 Corr.	3.50
307-	Brothar HR15/25/35 M/S	3.75
227-	CPT Rotary 8/9 M/S	2.95
158-	Diablo Hytypa II M/S	2.25
317-	Diablo Xerox Memorywriter	3.50
334B-	Epson DX 10/20/35 M/S	4.40
168-	Facit 4560/8000 Corr.	4.75
196	OEM-IBM5218/5219 Displaywriter M/S OEM	11.25
222-	IBM 8240 M/S	1.75
812	OEM-IBM Quietwriter N/C	10.95
740-	IBM Wheelwriter Corr.	3.50
730-	IBM Wheelprinter M/S	7.90
320-	IBM Selectric II H.Y. Corr.	1.55
202	OEM-NEC 2000/3500/8800 Flip M/S	11.80

"CALL US FOR VOLUME DISCOUNT PRICING"

No.	Description	Price (ea.)
201-	NEC 5500/7700 Spinwritar M/S	2.50
303-	Nakajima Corr.	3.50
304-	Nakajima M/S	5.50
334-	Olivatti ET 201/121 Corr.	3.00
334B-	Olivetti ET 121/351 M/S	4.40
222-	Oume I/Sprint 3/5 M/S	1.75
223A-	Oume III Quick Load	2.40
219-	Quma IV Sprint 7,8,9,10,11,12 M/S	2.95
227-	Ricoh 1300/1600 M/S	2.95
251-	Wang Syatem 5581/8541 M/S Matrix	2.95

TWIN SPOOL RIBBONS - NYLON

445-	Burroughs 9245/9247 5M	15.95
453-	CDC 100/200/300	4.75
450-	Cantronics 100/300/500	3.75
453-	Data 100/300/400	4.75
454-	Decision Date 6807/6811/6814	6.95
455-	Dec writar LA 30/36	2.50
456-	Dec writar LA 120/180	3.50
480-	Facit 4540/4542 Black	3.70
462-	IBM 3262/5262	4.95
465-	IBM 3525 T/S	3.00
483-	IBM 5211	3.75
464-	IBM 5225/5250/5280	14.50
470-	Okidata 80, 82, 92, 93	1.25
471-	Okidata 84,94	2.50
467-	Printronix 150/300/600	4.95
955A-	Seiko Univarsal Black/Red	1.25
470-	Star Micronics Gamini 10/10X	1.25
455-	Texas Instruments 800/810/815	2.50
456-	Texas Instruments Omni 820	3.50
401-	Wang 2221/5521	2.75

WIDE COMPUTER RIBBONS

0056P-BST 14"x10 yds.	7.95
0106P-Burroughs 9246 15"x20 yds.	15.95
0156P-Control Data CDC 15"x25 yds.	18.75
0256P-Data Products 2230/2330 15"x15 yds.	13.75
0276P-Data Producta 2400 14½"x15 yds.	13.75
0356P-Documation 1200 15"x20 yds.	15.95
0456P-Honeywell Pru 1200 17.8"x22 yds.	18.95
0106P-Hitachi 15"x20 yds.	15.95
0558P-IBM 1403/3203/4245 14"x20 yds.	13.25
0656P-IBM 3211/Documation 17"x20 yds.	16.25
0756P-IBM 4248 w/Imposer Strip 18½"x20 yds.	19.50
0958P-Univec 0770 15"x55 yds	36.00
0976P-Univec 0776 15¾"x20 yds.	16.50

LASER PRINTER SUPPLIES

92285A-Cannon/Hewlett Packerd Laser Cartridga	89.00
92295A-Cannon/Hawlatt Packard Lasar Jet II Cartridge	89.00

**This is only a partial list of our products.*

**$5.00 shipping and handling charge on all orders under $50.00 Over $50.00 actual freight is chargad.*

CIRCLE 344 ON READER SERVICE CARD

See why corporations such as General Motors, Mobil Oil, AT&T, MCI, Eastman Kodak, the entire U.S. Postal Service and thousands more are now using National Computer Ribbons™ brand products

WE NOW CARRY CANNON/HEWLETT PACKARD LASER PRINTER SUPPLIES.

Arlington Computer Products gives you the best prices on IBM PCs...

IBM AT

1.2 Floppy, 512K,
40 MB Hard Disk
w/Monochrome Monitor ... *$3295*
w/Color Monitor *$3495*

IBM XT

CALL FOR CUSTOM CONFIGURATIONS

IBM PERSONAL SYSTEM II

Model 30, 2 floppies w/Monochrome Monitor *$1475*
Model 30, 20 MB w/Monochrome Monitor *$1899*
Model 50, w/Monochrome Monitor *$2875*
Model 60, w/44 MB and Monochrome Monitor *$3595*
Model 60, w/70 MB and Monochrome Monitor *$3995*
Model 80, w/44 MB and Monochrome Monitor *$4595*
Model 80, w/70 MB and Monochrome Monitor *$5249*
Model 80, w/115 MB and Monochrome Monitor *$8295*
w/Color Monitor add $250

...and COMPAQ too!

COMPAQ 286

DESKTOP — 1 Drive
640K, 40 MB, Monitor *$2495*
PORTABLE II MODEL IV —
1 Drive 640K, 20 MB *$2850*
PORTABLE III —
1 Drive 640K, 20 MB *$3649*
w/40 MB *$4175*

COMPAQ DESK PRO

1 Drive, 640K, 20 MB
Green or Amber Monitor *$1695*

COMPAQ 386

Model 40 (16 MHZ) *$4195*
Model w/60 MB-20 MHZ..... *$5499*
Model w/130 MB-20 MHZ *$6849*
Model w/300 MB-20 MHZ *$9295*

COMPAQ PORT. 386

Model 40 ..... *$5699*
Model 100 ..... *$7195*

COMPATIBLE SYSTEMS

AST PREMIUM 286

10 MHZ keyboard switchable clock speed, 512K Ram, 1 floppy drive, 40 MB hard disk, parallel and serial ports, clock calendar, monochrome graphics adaptor, monochrome monitor.

$2299

DRIVES & TAPES

360K Floppy for PC $99
360K Floppy for AT $115
20 MB Tape for XT. $339
20 MB Tape for AT. $339
40 MB Tape for AT
or Compaq 386.... $459

SEAGATE HARD DISKS
20 MB for XT (ST225). $279
30 MB for XT (ST238). $299
40 MB for AT (ST251) . $389
40 MB for AT (ST251-1)$479
80 MB for AT $829

EVEREX
60 MB Internal $679
60 MB External ... $679

PRIAM HARD DISKS
40 MB $679
60 MB $819
130 MB $1999

IOMEGA
10 + 10 Bernoulli w/Controller..... $1489
20 + 20 Bernoulli w/Controller..... $1829

External 5¼" for PSII $259
PLUS hard card 20 MB..... $539
PLUS hard card 40 MB..... $699

VIDEO BOARDS

ATI EGA Wonder $189
ATI VIP $269
Compaq VGA $499
Everex EGA Autoswitch.. $139
Genoa Super Hi Res $289
Graphics Card..... $79
Hercules Graphics Plus .. $179
NEC GB1 ..... $199
Paradise Autoswitch 480 . $189
Paradise VGA $189
Quadram Prosync $209
STB EGA Plus..... $239
Vega Deluxe..... $239
Vega VGA..... $289

MICE

Mouse Systems..... $99
Microsoft..... $109
Logitech $74

MONITORS

AMDEK
310A..... $129
410A..... $149
600 ..... $349
722 ..... $439

PRINCETON
MAX12..... $149
HX12 ..... $415
HX12E $449
Ultrasync $529

IBM
8502 ..... $199
8512 ..... $449
8513 ..... $519

NEC Multisync II $579
NEC Multisync Plus $879
SAMSUNG Color $259
SONY Multiscan..... $599

Arlington Computer Products, inc.
3025-E S. MALMO
ARLINGTON HEIGHTS, IL 60005

VISA MasterCard AMERICAN EXPRESS

FOR ORDERS & SYSTEMS QUOTES:

800-548-5105

CUSTOMER SERVICE AND IN ILLINOIS 312-228-6333
SHIPPING 312-228-6333
TECHNICAL ASSISTANCE 312-228-1470
FAX 312-228-0516

Prices and Availability Subject To Change Without Notice

Bringing you the best in IBM compatible peripherals since 1984.

OUR EPSON PRINTER PRODUCTS ARE SO GOOD WE NEED TO SHOW THEM OFF!

LX 800	***FX 286E***	***LQ 850***	***EX 800***
$189	***$419***	***$519***	***$399***
FX 86E	***LQ 500***	***LQ 2500***	***LQ 1050***
$299	***$319***	***$809***	***$719***

PRINTERS

EPSON

LX 800	$189	LQ 1050	$719
FX 86E	$299	LQ 500	$319
FX 286E	$419	LQ 2500	$809
LQ 850	$519	EX 800	$399

OKIDATA

192 Plus/193 Plus	$339/$449
292 w/Module	$449
293 w/Module	$589
393	$929
Laser Line 6	$1449

TOSHIBA

321 S/L/341 S/L	$499/$659
351 SX	$1010

NEC

P6	$435	P7	$619
3550	$729	P9XL	$1049
P5XL	$859	P2200	$349

PANASONIC

1080 I	$189	1091 I	$199

IBM

Quietwriter III	$1175
Proprinter II	$389
Proprinter X24	$549
Proprinter XL	$549
Proprinter XL24	$739

HEWLETT-PACKARD

Laserjet II	$1689
1 MG Upgrade	$339
2 MG Upgrade	$629
4 MG Upgrade	$1099

SOFTWARE

Crosstalk	$109
D Base III Plus	$379
Framework	$349
IBM Displaywrite IV	$299
Lotus 123	$299
Managing Your Money	$125
Microsoft Word	$209
Microsoft Excel	$329
Multimate Adv. II	$259
R Base System V	$409
Smartcom	$49
Symphony	$429
Ventura Desktop Publ.	$499
Volkswriter III	$145
Word Perfect 4.2	$199
Word Perfect Library	$59
Wordstar 2000+	$239

MODEMS

HAYES

1200	$289
1200 B Alone	$259
1200 B w/Software	$289
2400	$429
2400 B	$429
Everex 300/1200 w/Software	$99
Everex 2400 Internal	$179
Everex 2400 External	$249

MULTIFUNCTION BOARDS

Everex Magicard 384K	$169
AST 6 Pack w/384K	$229
AST 6 Pack Premium w/256K	$219
AST Advantage	$259
AST Rampage PC w/256K	$239
AST Rampage AT w/512K	$399
Orchid Tiny Turbo	$279
Intel Above Board PC	$239
Intel Above Board PC P/S	$279
Intel Above Board AT	$329
Intel Above Board AT P/S	$349
Irma Board	$695
AST 5251-11	$529
AST 5251-11 Plus Enhanced	$599

CHIPS

64K Ram Chips	9 for $25
256K Chips	each $11.50
8087-3	$109
8087-2	$149
80287	$159
80287-8MHZ	$249
80287-10MHZ	$289
80387-16	$469
80387-20	$739

★ ISSUE HIGHLIGHTS ★

AST RAMPAGE AT W/2 MEGABYTES	***NEC MULTISYNC MONITOR***	***MICROSOFT MOUSE***	***NEC MULTISPEED HD***	***EPSON PRINTER STAND W/PRINTER PURCHASE***
$649	***$579***	***$109***	***$2299***	***$15***
EVEREX 300/1200 MODEM W/SOFTWARE	***SEAGATE 30MB HARD DISK KIT***	***HP LASERJET II***	***NEC MULTISPEED EL***	***D BASE III***
$99	***$299***	***$1689***	***$1599***	***$379***

Arlington Computer Products, inc.
3025-E S. MALMO
ARLINGTON HEIGHTS, IL 60005

FOR ORDERS & SYSTEMS QUOTES:
800-548-5105
CUSTOMER SERVICE AND IN ILLINOIS 312-228-6333
SHIPPING 312-228-6333
TECHNICAL ASSISTANCE 312-228-1470
FAX 312-228-0516

Prices and Availability Subject To Change Without Notice

The New PC NETWORK — THE #1 COMPUTER WAREHOUSE CLUB!

SYSTEMS

THE™ TURBO PC/10 — 640K BASE SYSTEM

- AT style keyboard • IBM Compatible Bios • Mitsubishi Floppy Drive • 4.77-10MHZ • 150 Watt FCC approved power supply • AT style case w/keylock, LED indicator & reset switch • Monitor & TTL mono board (optional)

NEW

84303500 — $629.40*

PC/10 w/640K/1 Floppy/20MB HD (84303520) $888.00*

Membership Special—Free Configurations On All THE™ Products. 3.5" Drives Available.

LAPTOPS

TOSHIBA T-1200 LAPTOP

- 80C86 Processor
- 1MB RAM
- 20MB Hard Drive
- 720K 3.5" Disk Drive
- Parallel/Serial Port
- LCD Super Twist
- MS-DOS included

#1 SOURCE for LAPTOPS & PORTABLES

$2,125.00*

TOSHIBA T-1000 Laptop w/512K RAM, 720K 3.5" Drive $719.00*

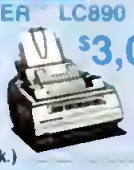
TOSHIBA T-3100/20 Laptop w/640K, 3.5" 720K Drive, 20MB Hard Disk $2,895.00*

TOSHIBA T-5100 w/2MB RAM, 40MB Hard Disk, 1.44MB Drive $4,595.00*

LASERS

NEC SILENTWRITER™ LC890

MEMBERSHIP SPECIAL BUY



$3,090.48*

LC800 Toner Cartridge (6 Pk.) $61.00*

HEWLETT-PACKARD LASERJET SERIES II

Your Laserjet Series II can handle all your printing needs—from postcard size to 8.5"x14" sheets. $1,625.22*

BUY NOW AT DISCOUNT WHOLESALE +8% PRICES!*

BUSINESS SOFTWARE

ASHTON-TATE Dbase III	$341.00*
ASHTON TATE [illegible] Adv	299.90*
BORLAND INT [illegible]	389.00*
BORLAND INT	119.00*
BORLAND INT. Sidekick Plus	111.00*
BORLAND INT. Superkey	55.50*
BORLAND INT. Turbo C or Turbo Basic	69.50*
BREAKTHROUGH SFT. Timeline 2.0	245.00*
CENTRAL POINT PC Tools Deluxe	37.50*
DAC SFT. DAC Easy Accounting	53.00*
FOX SOFTWARE Foxbase Plus 2.0	210.00*
IBM	80.00*
IBM	279.00*
LOTUS DEVELOPMENT Freelance +	299.00*
LOTUS DEVELOPMENT [illegible]	[illegible]
LOTUS DEVELOP. Symphony 2.0 +	405.00*
MERIDIAN TECH. Carbon Copy Plus	69.50*
MICROPRO INTER. 4.0 Wordstar Prof	215.00*
MICRORIM R:base System V 3.5"	397.00*
MICROSOFT "C" Compiler	244.00*
MICROSOFT Excel [illegible]282.50* [illegible]210.00*	
MICROSOFT Quick Basic 4.0 Windows	55.00*
MICROSOFT [illegible]	194.00*
MICROSOFT Works [illegible]109.00* [illegible]168.50*	
PEACHTREE SFT. A [illegible]	139.00*
PETER NORTON Utilities-Advanced	70.75*
QUARTERDECK OFFICE SYS. Desqview	69.00*
WHITE CRANE SYS. Brooklyn Bridge	69.00*
WORDPERFECT [illegible]	195.00*
WORDTECH SYSTEMS D B X L	80.00*
XEROX CORP. Ventura Publisher	459.00*

SOFTWARE AVAILABLE IN 3 1/2" MEDIA. CALL FOR PRICES.

HARD DRIVES, DRIVE CARDS, & TAPE BACKUP

THE [illegible] 20MB Hd Disk Card	$319.00*
IOMEGA Bernoulli II 20MB Int	902.00*
IRWIN 64MB Int. Tape for IBM PS/2	545.00*
IRWIN 145 40MB Internal Tape	395.00*
MAXTOR 380MB Int. ESDI HD	3,299.00*
MINISCRIBE [illegible] 40MB 1/2 Ht	239.00*
MINISCRIBE 3675 60MB HD Kit	469.00*
MINISCRIBE 6085 71MB Full Ht	739.00*
MINISCRIBE 6128 110MB RLL Full Ht	885.00*
PLUS DEVEL. Hardcard 20	499.00*
PLUS DEVEL. Hardcard 40	539.00*
PRIAM 230MB/12MS Hard Disk	2,100.00*
PRIAM 330 Int. ESDI Hard Disk	3,100*
SEAGATE ST-[illegible] 30MB HD	399.00*
SEAGATE ST-4096 80MB Full Ht	645.00*
SEAGATE ST-225 20MB Hd Disk	259.00*

DRIVES

THE [illegible] 1.2 Ht Add-On Floppy	$75.00*
AMDEK Laser Drive 1 CD-ROM	580.00*
CMS Int. 20MB HD w/Ctrl-PS/2	269.00*
CMS Same as Above w/40MB	399.00*
CMS 360K Ext PS/2 Floppy	229.00*
MITSUBISHI 3 1/2" w/2MB FD	95.00*
MITSUBISHI 360K 1/2 Ht Dr	69.00*

MICE, ACCESSORIES

LOGITECH Logimouse +	$79.00*
LOGITECH Hi-Res Mouse	CALL
MICROSOFT Bus/Ser Mouse w/Paintbrush	93.50*
MICROSOFT Bus/Ser Mouse w/Windows	125.00*
CENTRAL PT Deluxe Option Bird	105.00*
CURTIS Ruby + w/Fax Protector	63.00*
KENSINGTON Masterpiece +	99.00*
MACH III Mach III Joystick	30.25*
THE COMPLETE PC Complete Fax	295*
PTI Datashield S100	$2.00*
PLUS 3 1/2" DS/HD Box of 10	45.00*
TRIPP LITE IBAR 4-6 Prot	48.00*
THE™ 101-Key Keyboard	59.00*
THE™ 150 Watt P/S (XT)	89.00*
THE™ 200 Watt P/S (AT)	99.00*
640K & 256K CHIPS	CALL
DISKETTES 3 1/2" DS/HD (10)	42.00*
DISKETTES (25) Hi Den -IBM AT	32.50*
DISKETTES (50) 5-1/4 DS/DD	17.50*

Full Selection of Toners & Printer Ribbons. Call for Information.

COMPUTER SYSTEMS

AST Premium 286 Model 80	$1,527.50*
AST Premium 286 Model 120	2,137.32*
AST NEW! 386 (All Models)	CALL
COMPAQ [illegible]	2,326.00*
COMPAQ Deskpro 386/60MB	5,195.00*
COMPAQ Deskpro 386 130	6,530.00*
COMPAQ Portable III MDL 40	3,964.25*
[illegible]	1,499.00*
IBM PS/2 Model 50	2,475.00*
IBM PS/2 Model 80-41	4,100.00*
THE™ 286/12 + 512K 40MB 1.2MB	1,495*

Call For Best Pricing On Other Models

MATH CO-PROCESSORS

INTEL 80287 10MHZ Co-Processor	$299.00*
INTEL 80287 8MHZ Co-Processor	235.00*
INTEL [illegible]	143.00*
INTEL 80387-16 Co-Processor	475.00*
INTEL [illegible]	185.00*
INTEL 80287 Math Co-Processor	165.00*

DISPLAY CARDS

A.T.I. [illegible]	$199.00*
A.T.I. VIP VGA 800 x 560	239.00*
HERCULES Graphics Card Plus	199.00*
HERCULES IN COLOR CARD	199.00*
ORCHID [illegible]	239.00*
ORCHID [illegible]	379.00*
PARADISE [illegible]	149.00*
PARADISE VGA Plus Card	239.00*
VIDEO 7 Vega Deluxe 640x480	299.00*
THE™ Color Card	49.00*
THE™ H720 Mono Card	49.00*

FAX MACHINES

SHARP FAX FO-300

Sharp's deluxe, full-featured compact fax with automatic dialing, automatic document feeder, 16 second transmission & programming polling/ turnaround polling/ timer polling

NEW

$1,120.00*

SHARP FO20 Fax Paper Box of 6 Rolls $22.00*

Call For Best Prices On Other Models.

COPIERS

SHARP Z-50 Copier	$594.00*
SHARP Toner Cartridge	62.00*

PLOTTERS/DIGITIZERS/SCANNERS

HOUSTON INSTRUMENTS All Models	CALL
SUMMAGRAPHICS Summasketch Plus (12x12)	$339.00*
SUMMAGRAPHICS Summasketch (12x18)	559.00*

Call For Best Prices On Other Models.

THE™ CAPTAIN 286/12

NEW

- 512K Expandable to 1MB on the Motherboard • 6-12Mhz • Keyboard/ Toggle Switch Selectable • 1.2MB Mitsubishi Floppy • Hard Disk/ Floppy Controller • Phoenix Bios • 101 Key "AT" Style Keyboard • Monitor & Video Board Optional

$1,049.00* 84304010

Membership Special—Free Configurations On All THE™ Systems.

PRINTERS

CITIZEN

1600			$145.00*
MSP-50	359.00*	Trib. 224	569.00*
MSP-45	379.00*	Prem. 35	439.00*

EPSON

LX800			185.00*
LQ500	CALL	LQ1050	CALL
FX286E	CALL	EX800	CALL

NEC

LC860 +			1,752.12*
5200	CALL	P9XL	946.00*
P5300			CALL
P2200 Dot Matrix			314.00*

OKIDATA

Laserline 6			1,225.00*
390 +	459.00*	ML294 +	699.00*
ML 393	699.00*	ML 292 +	349.00*

PANASONIC

1091I MDL 2			185.00*
1080I			154.33*
1092I	297.00*	1592	399.00*

TOSHIBA

P321SL	463.00*	Pagelaser 12	2,395.00*
P351SX			925.00*
P341SL			615.00*

10,000 PRODUCTS IN STOCK

THE™ GENERAL 386/16

COMPAQ DESKPRO COMPATIBLE

THE SYSTEMS INCLUDE 15 DAY FREE HOME TRIAL

- 1MB RAM • 32 Bit 16MHz Operation • 200 Watt Power Supply • 101 Key 'AT' Style Keyboard • 1.2MB Mitsubishi Floppy Drive • Western Digital Hard/Floppy Controller • Phoenix Bios • Monitor & Video Board Optional

$1,990.00* 84304510

Membership Special—Free Configurations On All THE™ Systems.

MODEMS

HAYES Smartmodem 2400	$389.00*
HAYES Smartmodem 1200	259.00*
HAYES 1200B w/Smartcom	259.00*
HAYES 2400B w/Smartcom	389.00*
THE [illegible] Internal	99.00*
THE 1200 BAUD Int. w/Software	79.00*
THE 2400 BAUD External	159.00*
THE 2400 BAUD Int. w/Sft	89.00*
THE HST 9600	549.00*

MULTIFUNCTION CARDS

AST Advantage Premium	$279.00*
AST Six Pack Premium	185.00*
ORCHID Tiny Turbo 286	239.00*
ORCHID Twinturbo 20	349.00*
THE Multi 384 w/OK/P S/G	67.00*
THE Multi 1.5MB w/OK/P S/G	89.00*
THE Multi I/O AT w/P S/G	59.00*
THE Multi I/O w/P S/G/CLK/CAL	49.00*

MONITORS

THE [illegible]	$89.00*

AMDEK

1280	625.00*	730V	353.00*

IBM

8512	420.00*	8513	510.00*

MAGNAVOX 8762 14" Color RGB	249.00*
MITSUBISHI EGA 1430C (640x350)	394.00*
MITSUBISHI Diamond Scan	465.30*
NEC Multisync GS	175.00*
NEC Multisync Plus	799.00*

PRINCETON

HX-12 Plus	359.00*	Max-12E	128.00*
LM-300	465.00*	Ultrasync	465.00*

†RENT SOFTWARE BEFORE YOU BUY

Members are eligible to join The NEW PC NETWORK's Business and Game Software Rental Libraries to evaluate products for a full 14 days or 30 days to see if they meet your needs. Just 35% OF THE MEMBER WHOLESALE PRICE* We feature hundreds of new titles.

*ALL PRICES SHOWN ARE WHOLESALE AND REFLECT A 3% CASH DISCOUNT. The NEW PC NETWORK MEMBERS PAY JUST 8% ABOVE THE WHOLESALE PRICE. PLUS SHIPPING & HANDLING. Minimum shipping $4.00 per order. International orders call for shipping & handling charges. Money orders, personal and company checks please allow 7 working days to clear. All prices subject to change. Products subject to availability.

1-800-621-S-A-V-E

Corporate Order Hotline 1-312-280-0002

TECH SUPPORT: 1-312-280-0280
CUSTOMER SERVICE: 1-312-280-1567 PCM078
Fax: 1-312-943-6010 Telex: 510-601-5955

Monday-Friday: 8:30AM-6:00PM
Saturday: 10:00AM-4:00PM

VISA MasterCard

The NEW PC NETWORK
320 West Ohio, Chicago, Illinois 60610

CIRCLE 535 ON READER SERVICE CARD

Mail Order Electronics - Worldwide

Jameco ELECTRONICS

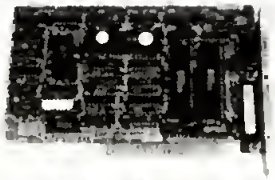
• QUALITY PRODUCTS
• COMPETITIVE PRICING • PROMPT DELIVERY

ORDER HOTLINE
415-592-8097

ALL OTHER INQUIRIES
415-592-8121

MEMBER DIRECT MARKETING ASSOCIATION

IBM PC/XT/AT Compatible Cards


JE1050

Graphic Display Cards

JE1050	Mono Graphics Card w/Printer Port (PC/XT/AT) . .	$59.95
JE1052	Color Graphics Card w/Printer Port (PC/XT/AT) . .	$49.95
JE1055	EGA Card with 256K Video RAM (PC/XT/AT) . . .	$169.95
JE1071	Multi I/O with Drive Controller and Mono Graphics (PC/XT)	$119.95

Multifunction, I/O and Expansion Cards

JE1060	I/O Card with Serial, Game, Parallel Printer Port and Real Time Clock (PC/XT)	$59.95
JE1061	RS232 Seriel Half Card (PC/XT/AT)	$29.95
JE1065	I/O Card with Serial, Game and Parallel Printer Port (AT)	$59.95
JE1078	384K Multifunction Card (zero-K on-board) Includes Seriel, Game, Parallel Printer Port and Real Time Clock (PC/XT) . . . . . ~~$79.95~~	$69.95
JE1080	576K RAM Card (zero-K on-board) (PC/XT)	$49.95
JE1081	2MB RAM Card – expanded or extended memory (zero-K on-board) (AT) . . ~~$129.95~~	$119.95
JE1082	3MB Multifunction Card – expanded or extended memory (zero-K on-board). Includes Piggyback board, Parallel Printer Port, Serial and Game Ports (AT) .	$169.95

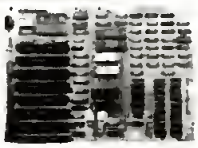
Floppy and Hard Disk Controller Cards

JE1040	360KB Floppy Disk Drive Controller Card (PC/XT)	$29.95
JE1041	20/40MB Herd Disk Controller Card (PC/XT) . . .	$79.95
JE1042	30/60MB RLL Herd Disk Controller Card (PC/XT) .	$99.95
JE1043	360K/720K/1.2MB Floppy Disk Cont. (PC/XT/AT)	$49.95
JE1045	360K/720K/1.2MB Floppy/Hard Disk Controller Card (AT) . . . . . ~~$159.95~~	$149.95
JE1046	20/40MB Herd Disk Controller Card (AT)	$129.95

Jameco's IBM PC/XT/AT Compatible Motherboards

• Award BIOS ROMs included

JE1001	4.77/8MHz (PC/XT).	$ 99.95
JE1002	4.77/10MHz (PC/XT). . . .	$119.95
JE1007	6/8/10/12MHz (AT).	$349.95


JE1002

RAM, V20 and Intel Math Coprocessors

*4164-150	65,536x1 (150ns).	$3.25
*41256-120	262,144x1 (120ns).	$13.95
*41256-150	262,144x1 (150ns).	$12.95
UPD70108-5	(5MHz) V20 Chip (Replaces 8088).	$7.49
UPD70108-8	(8MHz) V20 Chip (Repleces 8088 or 8088-2)	$8.95
8087-2	Math Coproc. PC/XT end Compat. (8MHz). . . .	$159.95
80287-10	Math Coproc. AT and Compat. (10MHz).	$309.95

Seagate 20,30,40 and 60MB Half Height Hard Disk Drives

ST225XT (Pictured)

ST225	20MB Drive only (PC/XT/AT).	$224.95
ST225XT	20MB with Controller (PC/XT).	$269.95
ST238	30MB Drive only (PC/XT/AT) (RLL Controller Needed).	$249.95
ST238XT	30MB with Controller (PC/XT). . . .	$299.95
ST238AT	30MB with Controller (AT).	$389.95
ST251	40MB Drive only (PC/XT/AT).	$429.95
ST251XT	40MB with Controller Card (PC/XT) .	$469.95
ST251AT	40MB with Controller Card (AT)	$539.95
ST277	60MB Drive only (PC/XT/AT) (RLL Controller Needed).	$499.95
ST277AT	60MB with RLL Controller Card (AT)	$639.95

IBM PC/XT/AT Compatible Floppy Disk Drives

JE1022

JE1020	360K (PC/XT/AT) Drive (Blk. Bezel) . .	$89.95
JE1021	360K (PC/XT/AT) Drive (Beige Bezel)	$89.95
JE1022	1.2MB (PC/XT/AT) Drive (Beige Bzl.)	$109.95

Toshiba 3.5" Internal Floppy Disk Drive

For IBM PC/XT/AT and Compatibles

• 720KB (PC/XT/AT) • Compatible with JE1043 controller card (left) • Installation Kit and bezels included

352KU. $129.95

IBM PC/XT/AT Compatible Monitors

TE5154

12" Amber Monochrome – TTL Input, High Resolution

AMBER. $99.95

14" RGB Color – CGA Compatible Amber/Green/Color Switchable, 640x200 Resolution

TTX1410. . . . . $279.95

14" EGA Color – EGA/CGA Compatible, 720x350 (max.) Resolution

TE5154. . . . . $399.95

IBM PC/XT/AT Compatible Keyboards

- Tactile touch keyswitches
- Switch selectable between PC/XT or AT
- Illuminated Caps Lock, Num Lock and Scroll Lock indicators
- Manual included

JE1015 Pictured

JE1015. . . . . $59.95

• Enhanced keyboard layout • 12 function keys • Illuminated LED indicators for Num Lock, Caps Lock and Scroll Lock • Separate cursor pad • Automatically switches between PC/XT or AT • Manual included

JE1016. . . . . $79.95

Jameco's IBM™ AT Compatible Mini-286 6/8/10/12MHz Kit!

JE1059 $519.95, (EGA Monitor and Card not included)

Part No.	Description	Price
JE1007	Baby AT Motherboard (Zero-K RAM – includes Award BIOS ROMs).	$349.95
JE1015	XT/AT Style Keyboard.	$59.95
JE1017	Baby AT Flip-Top Case.	$69.95
JE1022	5¼" Hi-Density Disk Drive.	$109.95
JE1032	200 Watt Power Supply.	$89.95
JE1043	360K/720K/1.2M Floppy Controller Card.	$49.95
JE1065	Input/Output Card.	$59.95

NEW

Regular List $789.65

SAVE $99.70!

JE2009* IBM AT Compatible Kit. **$689.95**

JE286M JE2009 Technical Manual. **$29.95**

*RAM not included – Minimum RAM configuration 512K (41256-120 RAM Chips – see left)

U.S. Funds Only
Shipping: Add 5% + $1.50 Insurance
(May vary according to weight)

California Residents:
Add 6%, 8½% or 7% Sales Tax
FAX 415-592-2503

7/88

$20.00 Minimum Order

IBM is a registered trademark of International Business Machines

MasterCard VISA

Mail Order Electronics - Worldwide
Jameco ELECTRONICS

Prices Subject to Change
*DRAM's Subject to Frequent Price Changes

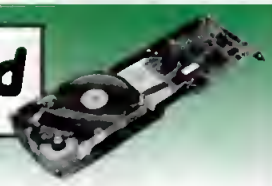
Send $1.00 Postage for a FREE 1988 CATALOG
Telex: 176043

©1988 Jameco Electronics

1355 SHOREWAY ROAD, BELMONT, CA 94002 • *FOR ORDERS ONLY 415-592-8097* • *ALL OTHER INQUIRIES 415-592-8121*

CIRCLE 346 ON READER SERVICE CARD

Leprecard



Leprecards feature components utilizing the latest technology from Seagate & Western Digital. You get a 1 year warranty, & illustrated user's guide. Low power drives mean less strain on the power supply, lower operating temperatures, and longer component life. **FREE SOFTWARE** including **TakeTwo,** the backup utility PC MAGAZINE Editor's Choice in 1986 & 1987, & PC-KWIK disk cache software from Multisoft.

21MB	30MB	30MB	40MB	49MB	65MB
85ms	85ms	40ms	70ms*	28ms*	16ms
$299	**$339**	**$389**	**$449**	**$549**	**$649**

*Average access speed per partition

TANDY 1000/A/SX/TX Leprecards add $20

3.5" Floppy Kits

Instant Laptop & PS/2 compatibility. All kits include bracket to mount in 5¼" drive bay, black & grey face plates, and AT rails.

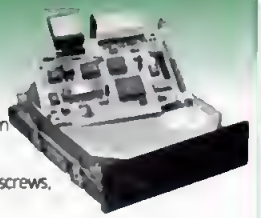
Now included **TakeTwo,** the backup utility PC MAGAZINE named as their Editor's Choice.

$119 720K internal for PC/XT/AT. Requires DOS 3.2 or optional $19 driver software.

$149 1.44 MB internal for AT only. Includes driver software.

$249 1.44MB internal for PC/XT. Includes high speed floppy controller & cables. Supports two drives.

PC/XT Disk Kits



- Pretested & formatted
- Western Digital short controller
- 30 page installation guide & reference manual
- Cables, mounting screws, full & half-height face plates
- **TakeTwo** backup software, PC MAGAZINE "Editor's Choice"
- **PC-KWIK** disk cache software by **Multisoft**
- 1 year Warranty, 30 day Money Back Guarantee
- Optional 150 watt, UL/FCC approved power supply for IBM PC's **$66**

TANDY 1000 kits add $20

20MB kit $289
Seagate ST225 21.4MB/65ms/Half-Height/14.8 watts

30MB kit $329
Seagate ST238 32.7MB/65ms/Half-Height/14.8 watts

40MB kit $459
Seagate ST251 42.8MB/Half-Height/11 watts pre-formatted into a pair of 21MB/28ms partitions

65MB kit $549
Seagate ST277R 65.5MB/Half-Height/11 watts pre-formatted into a pair of 32MB/28ms partitions

286[10] Computer

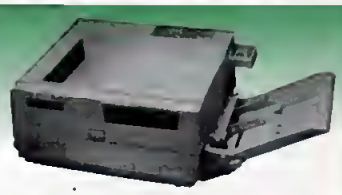
80286 processor at running at 6/10 Mhz with 0 wait states provides a Norton SI rating of 11.5. 8 slots · Room for 1 full height and 3 half - height drives · 200 watt power supply · Clock calendar · Choice of 1.2 or 1.44MB floppy drive · Combination Hard Disk/Floppy drive controller · Maxiswitch 84 or 101 key Keyboard · 512K RAM standard expandable to 1 M8 · Award BIOS · 1 year warranty · 30 day money back guarantee.

$895

Complete Systems with Serial/Parallel/Game Ports:

Monographics Card & Monitor	**$1095**	Orchid VGA & NEC Multisync II	**$1995**
with 20MB/65ms Seagate	**$1289**	with 20MB/65ms Seagate	**$2189**
with 40MB/40ms Seagate	**$1429**	with 40MB/40ms Seagate	**$2329**
with 65MB/40ms Seagate	**$1549**	with 65MB/40ms Seagate	**$2449**

1.5 MB Laser Printer



"One of the Laserjet's strongest competitors"
INFOWORLD October 5, 1987

512K RAM	1.5MB RAM
$1295	**$1595**

- 100% HP Laserjet, & Laserjet + compatible
- 1.5M8 RAM Gives Full Page 300dpi graphics
- Vector graphics capability improves speed on programs like Autocad up to 93%
- 9 resident & 5 downloadable soft fonts standard
- Printer utility software
- Serial & Parallel interfaces
- 120 day TRW on site maintenance
- 1 year Warranty
- Options: All HP style font cartridges. Toner Cartridge **$29**

AT Hard Disk Kits

- Includes IBM AT rails & cables
- **SpeedStor** or **OnTrack** large drive software
- Formatted, Partitioned & Tested

Size	Model	Speed	Capacity	Price
HH	Seagate ST251	40ms	42.8MB	**$399**
HH	Seagate ST251-1	30ms	42.8MB	**$489**
FH	Seagate ST4096	28ms	80.2MB	**$749**
FH	Micropolis 1333	30ms	44MB	**$555**
FH	Micropolis 1335	28ms	71MB	**$699**
FH	Maxtor 1140	27ms	117MB	**$1669**

Orchid

Designer VGA
1024x768 **$299**
Tiny Turbo 286 **$289**
Twin Turbo **$409**

Shamrock

2524B Townsgate Road, Dept. P / Westlake Village, CA 91361

Toll Free **800-722-AT-XT** California **805-373-7847**

MMC

- ★ No extra for Visa/Mastercard (AMEX add 3%).
- ★ Prices include UPS surface shipping.
- ★ Federal Express shipping just $1.50 per pound.
- ★ 30 Day Money Back Guarantee.
- ★ Corporate & Institutional PO's accepted.

2400 MNP Modems

$239/$229

- Hayes Compatible, 300/1200/2400
- MNP level 4 error correction
- **FREE** MIRROR II Software, a $69 value
- Internal model $229, fits in short slot

Internal with MIRROR II (non MNP) $139

1200 Modem

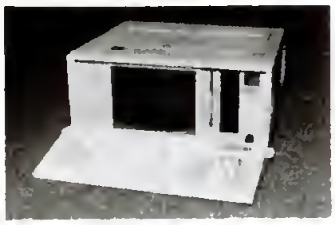
$69

- 300 or 1200 bps speed
- Hayes Smartcom II compatible
- Line-busy detect, auto redial
- FREE MIRROR II software
- Made in USA, 1 year warranty

It's Easy Deciding Why to Buy CEC Personal Systems...

It's even Easier Deciding Where!

The CEC Computer Warehouse. We offer you all you could want in a personal computer. Our AT's and 386 machines offer power, compatibility, technical support, service, and great prices!



Our System 1: Portable AT has 80286-10 Micro Processor, 80287 Socket, 512KB RAM, 360KB Floppy Drive, 1.2MB Floppy Drive, Parallel, Serial Port(s), 7 Expansion Slot(s), 101 Key(s) Keyboard **$1449.**

Our System 2: Desktop AT has 80286-12 Micro Processor, 80287 Socket, 512KB RAM, 360KB Floppy Drive, 1.2MB Floppy Drive, Monographic/Color Card, Parallel, Serial Port(s), 101 Key(s) Keyboard, 8 Expansion Slot(s). **$1550.**

Our System 3: Desktop AT has 80286-10 Micro Processor, 80287 Sockat, 512KB RAM, 360KB Floppy Drive, 1.2MB Floppy Drive, Monographic/Color Card, Parallel, Seriel Port(s), 101 Key(s) Keyboard, 8 Expansion Slot(s). **$1350**

We design, build, end tast for your quality assurance. 100%IBM competible. Complete softwere compatibility. Excellent service end warranty. Your satisfaction is guaranteed! Call us today!

The Comtrek Computer Warehouse
80 Felton Street
Waltham, MA 02154
617-894-1202
US 1-800-527-6016
MA 1-800-527-5995
Mastercard/Visa/American Express Accepted

CIRCLE 512 ON READER SERVICE CARD

SPECIAL

GENERIC CADD 3.0
- Auto Dimensioning
- Dot Plot
- Drafting ENH 1
- Drafting ENH 2

$119 LTD QTY

SAVE UP TO 70%

PRODUCTS NOT LISTED...CALL

CAD...etc. PC & MAC

SINCE 1984

AST PREMIUM 286/386

NEC MULTISYNC II $565

MITSUBISHI Diamond Scan **$477** | 40/70 Mb Disk **$499**

VENTURA PUB. 1.1 $464 | **PAGE —MAKER $429**

DRAFIX 1 PLUS **$149** | 3D MOD. **$159**

FOX BASE PLUS $179 | **R: BASE for DOS $416**

PC-FULLBACK $45

SMART MODEM 1200B int **$59** | 2400B int **$145**

TOPS $99

PRINTERS • LASERS • SCANNERS

AST TurboLaser/PS	Call	1091i-M2	$190
Citizen 120-D	$130	1092i	$280
180-D	$157	1524	$524
MSP 15E	$295	1592	$389
MSP-40	$299	1595	$399
MSP-45	$389	3131	$256
MSP-50	$358	3151	$385
MSP 55	$449	Scanner	$300
Premiere 35	$438	Personal Laser (Mac)	$1356
Tribute 124	$439	Star Micronics	
Tribute 224	$578	NX1000	$190
Diconix 150	$309	NX15	$295
H-P Laser Jet Series II	$1599	NO15	$375
JDL 850	Call	NR10	$325
NEC P-6	$425	NR15	$418
P-7	$609	Toshiba 321 SL	$489
P-9	$1018	341 SL	$609
3510 3550	$719	351 SX	$899
9810 8850	$1839	351 C-2	$1018
Panasonic 1080i M2	$155		

PANASONIC 1091i $190

PFS & HARVARD 60% OFF LIST EDUCATION ONLY!

CHIPS 64k 256k 8087 80287/387 . . . . . Call

MONITORS • TERMINALS • PANELS

Amdek 1280 w/card	$530	Samtron	Call
Hitachi	Call	Sigma Designs	
Logitech Multiscan	$449	LaserView 15/19"	Call
Mitsubishi		Sony Multiscan 1303	$549
Diamond Scan	$475	Taxan	Call
Others	Call	Viking	Call
NEC Multisync	$530	VMI	Call
Multisync II		Zenith 1490 Flatscreen	$580
Plus & XL	Call		

SOFTWARE

ACT!	$190	Norton Util 4.0	$46
AutoCad	Call	PageMaker	$429
AutoSketch	$50	Paradox 2.0	$309
BoeingGraph 3D	$186	PathMinder	$55
Canvas (Mac)	$93	PC-Fullback	$49
Carbon Copy Plus	$103	Peachtree	
CPA+ for Lotus 123	$190	Accounting II	$145
Clipper	$365	PFS First Choice	$79
Copy II PC	$18	PFS First Publisher	$56
dBase III Plus	$355	PFS Professional File	$129
DesqView	$80	PFS Professional Plan	$55
Drafix 1 Plus	$149	PFS Professional Write	$105
Drafix 3D Mod/Options	Call	Q&A	$177
DS Back Up Plus	$33	Q&A Write	$115
Excel Mac/PC	$178/$281	Quattro	$145
FastBack Backup	$75	R Base for DOS	$419
Fax Base Plus	$179	ShipMate™	
GEM Draw Plus	$159	(UPS Manifest)	$249
Generic Cadd 3.0	$55	SuperSpool (Mac)	$36
Generic & Dot Plot 3.0	$71	Tops (IBM or Mac)	$101
Generic Editor Choice	$118	Turbo Basic	$87
Generic Options	Call	Turbo C	$57
Harvard Graphics	$256	Venture Publishing 1.1	$464
Harvard Tot Proj Mgr	$317	VersaCad/Libreries	Call
Lighting HD Speedup	$84	WordPerfect 4.2	$187
Lotus 123 2.01	$283	X-Tree	$35
MathCad 2.0	$189	X-Tree Pro	$53
MS-Dos 3.3	$99		

DIGITIZERS & PLOTTERS

Calcomp 1043-GT	$8199	MP Options	Call
1023-GT	Call	Hitachi	
Digitizers	Call	11×11 Tablet	$399
Enter Sweet-p 800	$500	15×15 Pro Tablet	$549
Others	Call	H-P Plotters	Call
Houston Instruments		Intec	Call
DMP 41/42	$1999	JDL 850	Call
DMP 51MP	$3550	Kurta IS 12×12	$799
DMP 51/52MP	$3150	IS 12×17	$499
DMP 52	$2680	Summagraphics	
DMP 56A	$3685	12×12 Plus	$344
DMP 81	$3295	18×12 Professional	$589
DMP 82	$4560		

COMPUTERS

AST Premium 286 & 386	Call	T1200	$2389
NEC Multispeed	$1289	T1100/T3100	
Multispeed EL	$1545	Modem H M	$179
Toshiba T1000	$759	T3100/20	$3050
T1100+	$1359	T3200	$3799
		T5100	$4679

Intel coprocessors

8087-2 (8 MHz)	$138
80287-8 (<10 MHz)	$219
80287-10 (≥10 MHz)	$262
80387-16	$438
80387 20 (20 MHz)	$668

BOARDS & NETWORKS

AST Boards	Call	Paradise AutoSwitch	
ATI EGA Wonder	$199	EGA 480	$145
VIP VGA	$249	VGA Plus	$229
Control Sys Artist	Call	VGA Pro	$349
Genoa SuperEGA	$199	ProGrappler	$71
VGA 600×800	$299	Sigma Designs VGA	$199
VGA 780×1024	$389	Tops Flashcard	$143
Grappler C/Mac/GS	$71	Ultimate EGA+	
Hercules Graphics Plus	$169	Autosw P-port	$129
Intel	Call	Video 7 Vega	
NEC GB 1	$299	Verticom	Call
Novell Network 286	Call	Video 7 Vega	
Number 9	Call	Deluxe w/VGA	$177
		Vega VGA	$259

DRIVES • MODEMS • FAX

Hayes	Call	2400B & SW	$145
Mitsubishi 40/70 Mb 1/2ht		Toshiba 3.5" XT/AT	
AT 23-28ms Drive	$499	720k Drive	$95
Seagate ST225		360k Drive 5.25	
20 w/Card	$200	XT/AT	$75
ST238 30 w/Card	$299	US Robotics	
SmartModem 12008 & SW int	$50	Courier 2400	$299

MOUSE

Logitech C7			
Serial/Bus	$89		
Hi-Res Bus	$99	Logimouse & Publisher	$104
Logimouse Bus & Paint	$84	Microsoft Mouse	$99

HELPERS

Logical Connection 256K	$349
512k	$399

MHI Warehouse, Inc.
P.O. Box 10261
Phoenix AZ 85064-0261
TOLL FREE credit with order
602-861-1090
Customer Service Hrs 10-3 PT M-F
Ordering Hours 7-5 PT M-F 9-2 SAT

Pre-approved PO's are welcome. Prices reflect cash discount and are subject to change without notice. Product compatibility warranties & claims are responsibility of manufacturer only. All returns are subject to a restocking fee. Personal/Co checks delay shipping. AZ orders only add 6.7% tax.

CIRCLE 367 ON READER SERVICE CARD

Best Prices Best Service

HARDWARE

COMPUTERS		PRINTERS	
ACER 386	CALL	**Citizen** All Models	CALL
AST Premium	CALL	Diconix 150P	335
NEC Multispeed	CALL	**EPSON** All Models	CALL
Sharp Laptop	CALL	NEC P2200	355
Toshiba Laptops	CALL	**Panasonic** All Models	CALL
		Laser Printers	**CALL**
		AST Turbo PS	
		DTC Crystal Print	
		NEC LC890	
		Panasonic 4450	
		QMS Kiss	
		TI Omnilaser	

DRIVES/TAPE		OTHER HARDWARE	
Seagate Drives	CALL	The Complete PC	CALL
Miniscribe Drives	CALL	Sharp UX140FAX	1099
Priam Drives	CALL	Hayes Modems	CALL
Plus Hardcard 40	699	Practical Modems	CALL
Bernoulli Box II	CALL	AST Turboscan	1149
Archive XL 40MB Tape	319	Datacopy Scanners	CALL
Everex 60MB Tape	CALL	Princeton Scanner	749
Panasonic Worm Drive	CALL	Kurta Digitizers	CALL

BOARDS			
Paradise VGA+	249	Summasketch Plus	389
EGA Wonder	189	Roland Plotters	CALL
ATI VIP	275	Sweet P600	679
Genoa Super Hi Res	189	AST Turbovision	1399
Vega VGA	275	Mitsubishi Monitors	CALL
384K Ram Card	CALL	NEC Multisync II	CALL
AST Ram Cards	CALL	Princeton Ultrasync	515
AST 5251/11	CALL	SONY MONITORS	CALL
Ast Hot Shot 286	355		
Above Board 286	319		
Mach 20 Turbo	**335**		
Inboard 386 PC	769		
In Board 386 AT	1049		

SOFTWARE

ACCOUNTING		SPREADSHEETS	
Acc Pac BPI	239	Boeing Calc	205
Complete Bus Acctg	159	Framework II	CALL
Compulaw Billing	729	Lotus/Symphony	CALL
DAC EZ Accounting	60	Microsoft Excel	309
New Views	CALL	**Quattro**	**135**
Open Systems	CALL		
Timeslips III	115		

DATABASE		WORD PROCESSING	
Data Perfect	265	Grandview	175
dBase III Plus	CALL	Microsoft Word 4	CALL
DB XL Diamond	115	Microsoft Works	129
Fox Base +	205	Multimate Advantage II	259
Omnis Quartz	449	PFS First Choice	93
Oracle	126	PFS Pro Write	117
Rapid File	185	Word Perfect	205
Paradox 2.0	435	Wordstar 2000 Plus	225
Q & A	199		

GRAPHICS		UTILITIES	
Byline	185	Quick Basic/C	64
Page Maker	CALL	Turbo Pascal/Basic/C	64
Page Perfect	**239**	Desqview 2.0	75
PFS First Publisher	59	Windows	64
Auto Sketch	52	Windows 386	125
Boeing Graph	205	Brooklyn Bridge	77
Design Cad or 3D	159	Calendar Creator+	33
Diagraph/2000	249	Deskink	95
Draw Applause	**259**	Disk Technician	65
EGA Paint v2005	53	Laplink	72
Freelance Plus	329	Mace Utilities	54
Generic Cad	55	Metro	61
Graph in the Box	55	Norton Guides	55
Harvard Graphics	289	Norton Utilities Adv	78
Show Partner FX	249	PC Tools Deluxe	43
Genius Mouse/Dr Halo	59	Sidekick Plus	116
Felix	119	SQZ Plus	59
Microsoft Mouse	105	Xtree Pro	68
		Statgraphics	479
		Super Project Expert	419
		What's Best	CALL

800-662-2686 orders only

for Ca Orders, Tech Support **415-255-2230**

Call or Write for Free Catalog

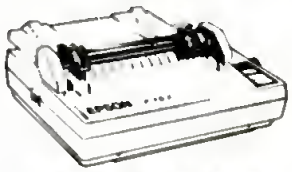
PAYMENT Visa, MasterCard, Cashier's Checks, Personal Checks with hold, Qualified P.O.'s. CA orders add sales tax **SOFTWARE SHIPPING**— UPS ground-2% of order $5 min. UPS Blue-3% of order, $7 min **HARDWARE** — Call for charges **DEFECTS:** Replaced or repaired at our option **RETURNS:** Subject to restock fee

All Products New with full warranties
Price & availability subject to change without notice

THE BAY Express COMPANY

584 CASTRO ST., SUITE 487 SAN FRANCISCO, CA 94114

EPSON



EPSON® PRINTERS

MODEL			PRICE
LX-800	9-PIN	80 COL	CALL
FX-86E	9-PIN	80 COL	CALL
FX-286E	9-PIN	136 COL	CALL
EX-800	9-PIN	80 COL	CALL
EX-1000	9-PIN	136 COL	$465
LQ-500	24-PIN	80 COL	CALL
LQ-800	24-PIN	80 COL	$295
LQ-850	24-PIN	80 COL	CALL
LQ-1000	24-PIN	136 COL	$499
LQ-1050	24-PIN	136 COL	CALL
LQ-2500	24-PIN	136 COL	CALL

EPSON ACCESSORIES
TRACTORS, CUT-SHEET FEEDERS, SCANNERS, SERIAL BOARD, RIBBON & CABLES

NEC

NEC PRINTERS

MODEL			PRICE
P2200	NEW MODEL		CALL
P660	24-PIN	80 COL	$435
P760	24-PIN	136 COL	$599
CP660	COLOR	80 COL	$519
CP760	COLOR	136 COL	$689
P5XL	24-PIN	136 COL	$839
P9XL	24-PIN	136 COL	$1025
LC850	PAGE	PRINTER	CALL
LC890	PAGE	PRINTER	CALL
LC860	PAGE	PRINTER	CALL

NEC MONITORS

MULTI SYNC II
COLOR MONITOR **$579**

GUARANTEED BEST PRICE • BEST SERVICE

ELECTRONIC WHOLESALE HOUSE OF AMERICA

ORDERS SHIPPED WITHIN 24 HOURS

1-800-458-5446
in IL call 1-312-498-7980

Send check or money order to
Electronic Wholesale House
3206 Doolittle Dr
Northbrook, IL 60062

VISA

WE OFFER TECH SUPPORT AND WARRANTY SERVICE

CIRCLE 520 ON READER SERVICE CARD

This Section Is For Serious Buyers

We've rounded up all the direct marketers who want your business and made it easier for you to find them in our Direct Marketing Connection.

Now you can quickly find the right PC products and services, the right price and the right vendor, right here in this special section.

PC MAGAZINE

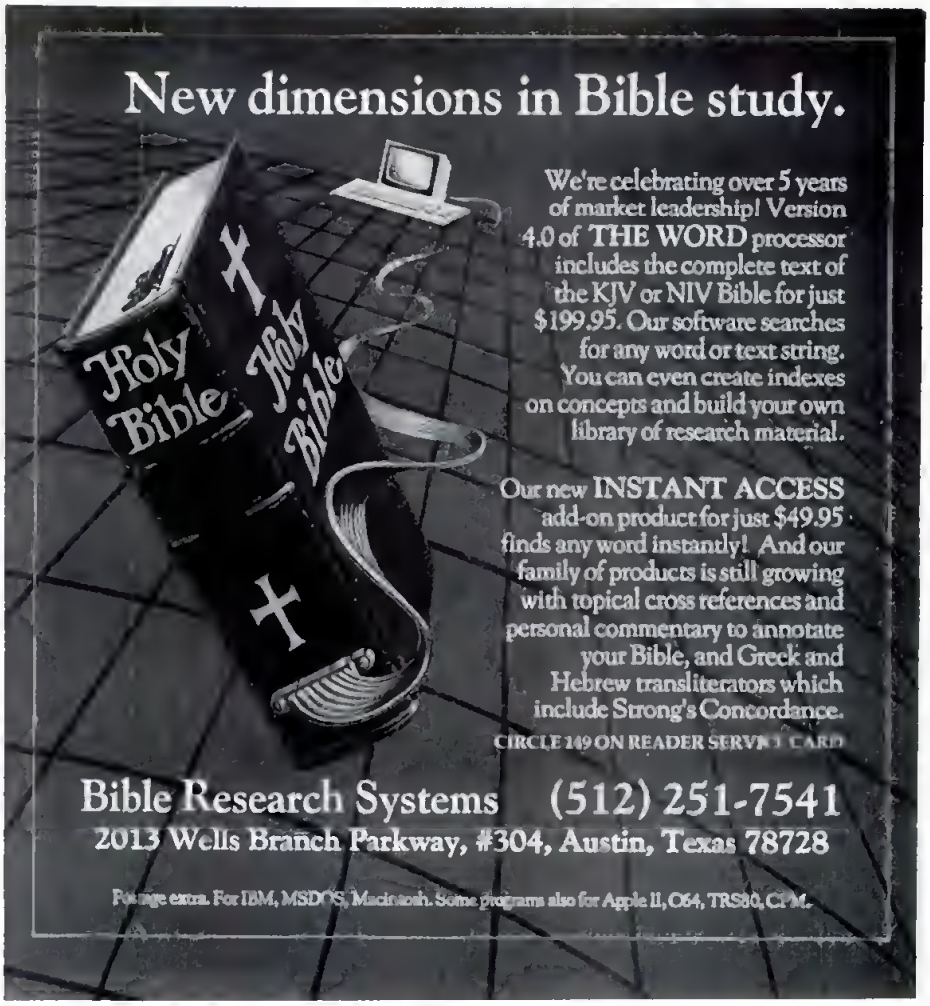
FOR HARDWARE MARKETERS, THE WORD IS PC MAGAZINE PULLS BEST

Your competitors know a good thing and they're sticking with PC Magazine. So should you, on a regular basis. Why?

For one thing, 70% of PC Magazine subscribers plan to buy or authorize the purchase of *printers* in the next 12 months.* PC Magazine is the most cost efficient way to sell PC products and services, whatever you market. You get bigger reach, more pull, and 15% off the general advertising rate. Can you afford not to be in every issue?

*1987 Plan to Buy Study

PC MAGAZINE
One Park Avenue
New York, NY 10016
(212) 503-5100



Genealogy
LM $79.00
Lineage Master © Genealogy Data Base Manager
Call GeneeLogic Systems Toll Free 1-800-222-9409

If you are looking for fast convenience, user friendliness, intuitive logic and flexible power, Lineage Master© is for you! Self tutoring while you are learning, gets you up to speed fast. Automatically bypass tutoring as you learn it's commands. No wasted time with endless menus and constricting data access regiments. Lineage Master© allows you to work the way you think. Flexibility! All family linkage is automatic, no need to remember record numbers!

Lineage Master© is by far the most productive genealogy program available on the market today. Increase your productivity over ANY other genealogy program you might be using. Lineage Master© will accept data from most other popular genealogy data bases.

Lineage Mester© hes feetures you will love!

- Command driven with prompts, access all functions with one or two key strokes.
- Context sensitive on-screen helps
- Automatic family linkage
- Browse among individuals, families intuitively
- Electronic Scratch Pad stores selected records for later recall
- Automated record deletion and relinking
- Auto Child Sorter, children are always in chronological order
- Jump quickly to any record
- Ditto repetitive names and places when adding new records. Avoid redundant data entry
- Find records FAST, even in large data bases by partial spellings
- Maintain Blood and Adoptive pedigrees
- User defined events, change default events to match your needs
- Source citations, event linked documentation
- Event linked notes
- Document both families and individuals
- Instant name sorting, even in large data bases
- Report Generation: single, batched and continous reports
- Print pedigree, associated family groups and documents all from a single command
- Reports
  - Family Groups (cross referenced to pedigrees)
  - Pedigrees automatically numbered
  - Alpha sorted individuals
  - Alpha sorted marriages
  - User defined reports, design your own reports
  - LDS submissions
  - Print reports within selected alpha or numeric ranges
  - Many more
- LDS GEDCOM standard compatible
- Data files compatible with DBASE II & III
- Runs on PC-DOS/MS-DOS, CP/M
- Up to 65,535 person capacity

• FREE UPGRADES FOR 1 YEAR!

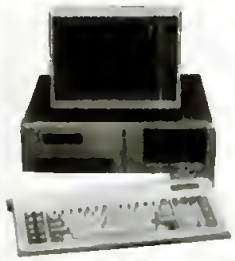
We guarantee you will prefer Lineage Master© over any other genealogy program. Take Lineage Master© for a test drive today. If your time is worth anything, at only $79.00, Lineage Master© is a bargain over other genealogy software at any price.

Endorsed by the British Heritage Forum and professional genealogists
Approved for submissions to the LDS Family History Department.
Call toll free, 1-800-222-9409, or write to:
GeneaLogic Systems, 140 West 900 South, Orem, Utah 84058

CIRCLE 522 ON READER SERVICE CARD

WHOLESALE PRICE TO PUBLIC!

PINECOM 10MHz TURBO 'XT' COMPLETE SYSTEM



- 256K RAM on board (Exp. to 640K)
- 150W power supply (ready for 2 more hard disks)
- Mini AT case w/LED, keylock & reset button
- one 360K floppy disk drive w/controller
- AT style keyboard (84 keys)
- 8088-2 microprocessor
- 8 IBM I/O slots
- TTL amber monitor
- Monochrome graphic card w/printer port
- ** Add $200 for RGB color system
- ** Add $450 for EGA system

Fully Assembled & Tested
1 Year Parts & Labor Warranty..... **$499.00**

PINECOM 'AT' 286 COMPUTER

- 512K RAM (Exp. to 1MG on board)
- 1.2M floppy disk drive w/controller
- 6/10 MHz clock selectable
- 80286-10 CPU
- 220W power supply
- AT style keyboard (84 keys)
- Clock calendar w/battery backup

CIRCLE 255 ON READER SERVICE CARD

Fully Assembled & Tested
1 Year Parts & Labor Warranty... **$799.00**
*The Land Mark Speed Test, Landmark Software Inc.
PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

pinecom™

SPECIAL SALE PRICES

All hard disks are formatted to specification
Ask us about printers

SEAGATE ST-225 20MG hard disk w/controller (65ms)	$279.00
SEAGATE ST-238 30MG hard disk w/controller (65ms)	319.00
SEAGATE ST-4038 30MG hard disk for AT (38ms)	515.00
SEAGATE ST-251 40MG hard disk (40ms)	429.00
SEAGATE ST-4096 80MG hard disk (28ms)	820.00
720 3½" floppy disk drive (installation available)	135.00
Color graphic card w/printer port	60.00
Monochrome graphic card w/printer port	60.00
EGA card w/printer port	160.00
EGA Wonder card	229.00
12" monochrome monitor	80.00
12" flat screen monochrome monitor	99.00
14" monochrome monitor	120.00
14" RGB color monitor	299.00
14" EGA monitor	366.00
NEC Multisync EGA monitor	580.00
Copy II PC option board (copies all prot. software)	69.00
Logitech serial mouse w/software	89.00
4 serial port card for AT (MS-400-AT)	125.00
4 serial port card for XT (MS-400-XT)	89.00
300/1200 baud internal modem (short card)	85.00
300/1200 baud external modem (Mitsuba)	125.00
EPSON FX-86E 240cps dot matrix 80 col NLQ	360.00
EPSON FX-286E 240cps dot matrix 132 col NLQ	495.00
EPSON LQ-1000 180cps 24 pin 132 col NLQ	670.00
OKIDATA ML-182 120cps dot matrix 80 col. NLQ	245.00
OKIDATA ML-192 200cps dot matrix 80 col NLQ	366.00
OKIDATA ML-193 200cps dot matrix 132 col NLQ	529.00
CITIZEN 180D 180cps dot matrix 80 col NLQ	210.00
NEC V-20 chip	20.00
Upgrade kit for your PC/XT to 640K main memory	145.00

386 SYSTEM
- 80386/16 16MHz processor
- enhanced keyboard (101 keys)
- 1MG RAM on board (exp. to 2MG)
- 60MG hard disk drive (28ms)
- 1.2M floppy drive
- Monochrome graphic card & monitor

CALL!!

PINE COMPUTER INC.

9690 TELSTAR AVENUE. EL MONTE. CA 91731
STORE HOURS: MON - SAT 9:00 AM - 6:00 PM
PHONE ORDERS WELCOME (818) 575-1882

VISA
MasterCard

TERMS: VISA or Mastercard accepted COD order on Cashiers Check only Check shipping charges when ordering. 3% surcharge for all credit card purchases

TELEX: 5106017376 PINECOM
FAX: 818-575-1897

US Robotics

9600 HST
WITH 17,200 BPS THRUPUT AND ERROR CORRECTION.
NOW ONLY **$599**
WHILE SUPPLY LASTS.

FAMOUS BRAND

2400 BAUD MODEMS
- Hayes compatible
- 300, 1200, 2400 Baud
- 2 year warranty

NOW ONLY **$99**
IN PAIRS · SINGLES ADD $9

FAX ON-A-CARD

Fully automated FAX now to any Group III FAX machine Unattended background operation. Send scanned, ASCII, or word processed files Use any laser or dot matrix printer for output
PC EDITOR'S CHOICE
$289
Hand Scanners Available

MULTI-LINE INTEGRATED VOICE MAIL TELEPHONE RESPONSE CARD

100s OF USES

IDEALLY SUITED FOR:
- Information & Order Taking
- Voice Mail Answering System
- Mail Forwarding & Pager Alert
- In & Outbound Telemarketing
- Fully Menu Driven by Calling Party. Fits in PC card slot

THE PROFESSIONAL FROM ONLY **$239**

BEST PRICES ANYWHERE!

30 MB HARD DISK SYSTEM
286 AT
- Intel 80286 Processor
- 80287 Co-Processor Slot
- 30 MB Seagate H/D
- VGA/EGA Graphics Card
- Novell, IBM. & OS/2 Compatible System

NOW ONLY **$995**
Your Choice of Optional Monitors

HUNDREDS OF SALE ITEMS EVERY DAY!

TOSHIBA 130 MB HD	$999.	VIDEO-7 VGA CARD	$289.
TOSHIBA 2 MB 3½ IN. FD	129.	ORCHID (1024x768)	319.
TOSHIBA 1.2 MB 5¼ FD	99.	ORCHID 286 CARD	389.
MINISCRIBE 43 MB HD	369.	QUADRAM 386/XT	699.
SEAGATE 30 MB HD	299.	GENOA EGA & GEM	199.

VISIT OUR 24 HR BBS (805) 650-0193 (8/1/N)
FOR COMPLETE CATALOG & PRODUCT LISTINGS

ONLINE STORE

BRAND NAMES FOR MUCH LESS!
(805) 650-0188
THIS SUPERCEDES PRIOR ADS • SUBJECT TO SUPPLY ON HAND

MasterCard VISA American Express

Ask About BBS Software

CIRCLE 175 ON READER SERVICE CARD

PC MAGAZINE

LESS THAN $1.19 A COPY!

Guorontee delivery of more product reviews ond comparisons thon any other PC-oriented publication with a subscription to PC MAGAZINE —for less than $1.19 a copy!

Published 22 times a year, every issue contains authoritotive evaluotions ond product comporisons, complete with benchmork test results, from PC Labs, the publishing industry's only independent IBM PC-PS/2 product testing outhority!

Subscribe todoy ond save up to 60% OFF the newsstand price for PC MAGAZINE, the leoding mogazine for IBM-stondord microcomputing.

Yes!

PC MAGAZINE

Begin my subscription to PC MAGAZINE for:

☐ Two years (44 issues) for $51.97
Less than $1.19 a copy!
Save $1.76 off the newsstond price!

☐ One year (22 issues) for $31.97
Less than $1.46 a copy!
Sove $1.49 off the newsstond price!

Savings bosed on newsstond price of $2.95 per issue.

Mr./Mrs./Ms._____
Please print full name

Company_____

Division_____

Address_____

City_____

Stote_____ Zip_____

4SV23

☐ Payment enclosed ☐ Bill me loter

Add $22 per year for postage outside USA. U.S. currency only. Please allow up to 60 days for delivery of first issue. Basic annual subscription price is $44.97.

Yes!

PC MAGAZINE

Begin my subscription to PC MAGAZINE for:

☐ Two years (44 issues) for $51.97
Less than $1.19 a copy!
Sove $1.76 off the newsstond price!

☐ One yeor (22 issues) for $31.97
Less than $1.46 a copy!
Save $1.49 off the newsstond price!

Savings based an newsstand price of $2.95 per issue.

Mr./Mrs./Ms._____
Please print full name

Company_____

Division_____

Address_____

City_____

Stote_____ Zip_____

4SV23

☐ Poyment enclosed ☐ Bill me loter

Add $22 per year for postage outside USA. U.S. currency only. Please allow up to 60 days for delivery of first issue. Basic annual subscription price is $44.97.

SUBSCRIBE NOW!

LESS THAN $1.19 A COPY!

The IBM-standard personal computing magazine that more readers turn to issue after issue.

(See other side for details)

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT #66 BOULDER, CO

POSTAGE WILL BE PAID BY ADDRESSEE

PC MAGAZINE
P.O. Box 51524
Boulder, Colorado 80321-1524

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT #66 BOULDER, CO

POSTAGE WILL BE PAID BY ADDRESSEE

PC MAGAZINE
P.O. Box 51524
Boulder, Colorado 80321-1524

HOW TO SUCCESSFULLY BUY THROUGH MAIL ORDER AND PROTECT YOUR RIGHTS

Mail order sales are governed by rules of the Federal Trade Commission (FTC) and various state laws. These guidelines are published as a service to you. Remember, the many vendors advertising in PC Magazine are eager to serve your needs.

FTC rules say:

1. The Seller must ship your order within 30 days of receiving it, unless the advertisement clearly states it'll take longer.

2. If it appears that your order will not be shipped when promised, the Seller must notify you in writing in advance of the promised date, giving a definite new date, if known, and offering you the opportunity to cancel the order with a refund or consent to a definite delayed shipping date or an indefinite delay.

3. The Seller's notice must contain a stamped self-addressed card or envelope with which you can indicate your preference. If you don't respond to this notice, the Seller may assume you agree to the delay, but must either ship or cancel your order within 30 days after the original shipping date promised or required. A prompt refund must be made when an order is cancelled.

4. Even if you've consented to an indefinite delay, you retain the right to cancel the order at any time before the item has been shipped.

5. If you choose to cancel an order, that has been paid for by check or money order, the Seller must mail you a refund within seven business days. If you cancel an order for which you paid by credit card, the seller must credit your account within one billing cycle following receipt of your request. Store credits or vouchers in place of a refund are not acceptable.

6. In the event that the item you ordered is unavailable, the Seller may not send you substitute merchandise without your express consent.

TIPS WHEN ORDERING

When ordering by mail:

State precisely what merchandise you want, specifying details such as model, make, size, component parts, etc.;

Confirm the price and expected delivery date as stated in the ad;

Indicate whether you will accept a substitute product if the item you ordered is unavailable, and, if not, that your payment should be returned;

Don't send cash, you will have no record of payment if a problem arises, and;

Keep a copy of your order and all other correspondence with the Seller. Your records should include the company's name, address and phone number; a description of the item ordered; your cancelled check or a copy of the money order; record of the date you mailed the order; and any sales slips and shipping receipts.

When ordering by phone:

Note the time and date of your conversation and the name of the person you talk with;

Make a record of your order, the price, its promised availability and the components to be expected;

Save all correspondence associated with your order, including your cancelled check or a copy of the money order, and any written confirmation sent by the Seller.

Questions you should consider asking:

Does the advertised item come with all necessary parts and accessories? Are they from the same manufacturer?

Is it available for immediate shipping?. If not, when will it be available?

Has there been an increase in the advertised price?

What warranties does the item carry? Who provides the service?

What is the Seller's return policy?

What is the Seller's refund policy?

With whom should you correspond if there is a problem?

IF YOU HAVE PROBLEMS:

1. If you have not received your order as promised or if the item is defective, immediately notify the Seller in writing referring to your order by description, price, date, as well as by account number and order number, if available. Make sure you keep a copy of the letter.

2. If you complain by telephone, send a follow-up letter to confirm what was said.

3. If you think the merchandise is defective, reread your product instructions and your warranty carefully to be sure you don't expect features or performance the product isn't designed to give. Then contact the Seller for instructions. Don't return it to the Seller until you have been instructed to do so.

4. When returning merchandise make sure you keep the shipper's receipt or packing slip; your right to be reimbursed for postal cost is determined by store policy.

5. If you have completely discussed your problem with the Seller and are still not satisfied, write to the consumer complaint agency in the Seller's state. If you paid for the merchandise by credit card, you may have rights to withhold payment under a Federal law called the Fair Credit Billing Act.

PC MAGAZINE

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

MARKETPLACE

PRODUCT CATEGORIES

HARDWARE

ADD-ON-BOARDS 485
CABLES 485
COMMUNICATIONS . 485, 486
COMPUTER SYSTEMS 486, 487
DISK DRIVES 487, 488
DISKETTES 488, 489
EXPANSION UNITS 489, 490
MONITORS . . . . . .
PERIPHERALS 490
PLOTTERS 491
POWER PROTECTION . . . . . .
POWER COOLING SUPPLIES 491
PRINTERS 491
SECURITY 491
SPEED DEVICES 491

SOFTWARE

ACCOUNTING 492
ARTIFICIAL INTELLIGENCE . . . . . .
BACKUP SYSTEMS . . . . . .
BUSINESS 492, 493
BUSINESS PROJECT MANAGEMENT 493
BUSINESS TIME MANAGEMENT . . . . . .
COMMUNICATIONS 493
CONSTRUCTION 493
DATA BASE 494
DATA ENTRY 494
DATA MANAGEMENT . . . . . .
DESKTOP PUBLISHING 494, 495
EDUCATION 495
ENGINEERING 495, 496
ENTERTAINMENT/ GAMES 496
FINANCIAL 496, 497
FLOWCHARTING . . 497, 498
GENERAL 498
GRAPHICS 498
HEALTH 498
INVENTORY 498
LANGUAGES 498
LEGAL . . . . . .
MAILING PROGRAMS 499
MANUFACTURING 499
MEDICAL 499, 500
MULTI-USER SYSTEMS . . . . . .
MUSIC 500
ONE-OF-A-KIND . . . . . .
OPERATION SYSTEMS . . . . . .
PREVENTATIVE MAINTENANCE . . . . . .
PROGRAMMERS TOOLS 501
PUBLIC DOMAIN . . 501, 502
REAL ESTATE 502, 503
RELIGION 503
SALES MARKETING 503, 504
SCIENTIFIC . . . . . .
SECURITY 504, 505
SERVICES . . . . . .
SHAREWARE 505
STATISTICS 505, 506
SURVEYS 506
TAXES . . . . . .
TERMINAL EMULATION 506
TRAVEL . . . . . .
UTILITIES 506, 507, 508
WORD PROCESSING 508

MISCELLANEOUS

ACCESSORIES 508, 509
BAR CODING 509, 510
BOOKS . . . . . .
BUSINESS OPPORTUNITIES . . . . . .
CATALOGUES 510
COMPUTER INSURANCE 510
COMPUTER LEASING . . . . .
COMPUTER SERVICES . . . . .
CONSULTANTS . . . . . .
CONVERSION SERVICE . . . .
DATA CONVERSION 510
DIGITIZERS . . . . . .
DISK CONVERSION . . 510, 511
DISKETTE COPY SERVICE 511
EMPLOYMENT OPPORTUNITIES . . . . . .
FURNITURE . . . . . .
MAILING LISTS 511
NETWORKING 511
PUBLICATIONS 511
SUPPLIES 512
TRAINING/TUTORIALS . 512
TYPESETTING 512
USED EQUIPMENT . . . . . .

RATES AND INFORMATION

PC Magazine Classified Marketploce is a special economical section for product and service listings.

Listings are grouped by category and sold by column inches. Second color option available.

Standard Directory Listings are also available for a minimum of 4 issues at $500 per issue ($2000 total).

For additional information call 212-503-5115.

CLASSIFIED ADVERTISING STAFF

Group Sales Director
Kathryn J. Cumberlander

Group Sales Manager
Daniel L. Rosensweig

Support Manager
Monica B. Dixon

Sr. Advertising Coordinator
Linda Annis-Lopez

Advertising Coordinator
Wanda D. Brown

Production Manager
Anne Brockinton

Production Coordinator
Robert Clark

ACCOUNT MANAGERS

Glenda Campbell (212) 503-5118
NY, GA, PA, VA, DC, OH, AK, WY, MA

Veronica Farmer (212) 503-5156
TX, MN, WI, AR, NC, IN, RI, DE, SC, LA, ID, MT, OVERSEAS

Kathleen Morris (212) 503-5176
UT, TN, NB, HI, (CA 94000 & UP)

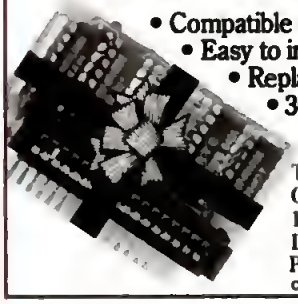
Kenneth Nova (212) 503-5175
WV, FL, VT, NH, (CA 93996 DOWN)

Michael Brooks (212) 503-5125
MI, CT, IL, KY, ME, OR, OK, AL, MO, NM, IA

Angela Kiffin (212) 503-5117
NJ, WA, MD, AZ, CO, NV, MS, KS, ND, SD (ALL CANADA)

HARDWARE/ADD-ON-BOARDS

Never enter time and date again.
dClock II $49.95 Slotless Clock-Calendar



- Compatible with most computers.
- Easy to install.
- Replaceable battery.
- 30-day money-back guarantee.
- Great gift idea.

To Order (214) 788-5198
Or write to Microsync
15018 Beltway Drive
Dallas, Texas 75244
MICRO
Please add $2.50 for shipping & handling
CIRCLE 551 ON READER SERVICE CARD

THE X-BANDIT 4 EMS 4
For XT/AT. Enhanced, expanded memory utilizing LIM 4.0 specifications. Segmented memory mapping, split memory addressing. 2 mb in one slot. 8 mb total. Spooler, RAM disk auto configuration software, manual, warranty all included. $175 list. Dealer pricing available.
TELETEK ENTERPRISES, INC.
4600 Pell Drive
Sacramento, CA 95838
(916) 920-4600

CABLES

COMPANION

Companion allows you to add an extra keyboard and monitor up to 250' from your PC system unit.
Operates with Mono, CGA and EGA monitors on IBM PC/XT/AT computers and 100% compatibles.
DEALER PROGRAM AVAILABLE
PRICES START AT $219.00
CYBEX CORPORATION
2800 H. Bob Wallace Ave.
Huntsville, AL 35805
(205) 534-0011
CIRCLE 554 ON READER SERVICE CARD

CABLES

Share PC's & Printers! PCM-125

Stop Plugging & Unplugging! Our Switch & Cable Packages make Switching a Snap. All YOU need is your Printer Cable!

One PC & Two Printers? Order our #2110 Package. Includes our popular Personal A/B Switch (all lines switched), a second Printer Cable (6' Fully Shielded) & a 6' Shielded Cable (DB-25 M/M) to link your PC to the Switchbox! $54.95 + $.75 Shipping

Two PC's & One Printer? Order our #2115 Package. Includes our popular Personal A/B Switch (all lines switched). And two 6' Fully Shielded Cables (DB-25 M/M) to link each PC to the Switchbox!

CIRCLE 568 ON READER SERVICE CARD

We STOCK a FULL LINE of DATA SWITCHES, CABLES, BUFFERS & SPOOLERS!

To Order Write or call Tipz Computer Accessories. Specify stock number, quantity & payment info (Visa, M/C, PO or Money Order). Each order is shipped the same day via UPS for FAST Delivery.

Orders, CALL 1-800-367-8479
Customer Service, CALL 415-626-4333
30 day money back guarantee!
If you'd like a FREE CATALOG, just write or call us!
MAIL Orders To: Tipz P.O. Box 690 San Francisco, CA 94101-0690

Tipz Computer Accessories

AT CLOCK BATTERIES

RAYOVAC Computer Battery $18.50
Long Life Alkaline Replacement for AT Type Lithium w/ 4-pin connector
3 Volt Lithium "Coin" Cell $3.50
for Multi-function boards
Visa MC Shipping incl.
1-800-336-5933
In IL: (312) 336-5933
Clairvoyant ✣ Systems
Computer Power Specialists
P.O. Box 8693 Waukegan, Illinois 60085
CIRCLE 569 ON READER SERVICE CARD

EGA GRAPHICS ADAPTER FOR AT&T SYSTEMS

- PC6300 • PC6300Plus
- PC6310 • PC6312
- PC6386

$169
Quantity discounts available
STB
1-800-854-0505
In NEW YORK 1-800-632-2444
CIRCLE 553 ON READER SERVICE CARD

NEW! VERS 2.0
BIGMOUTH™
REAL VOICE Digital Recording for your PC, XT, AT or Compatible
- ◆VOICE MAIL SYSTEM
- ◆TELEMARKETING - *Inbound & Outbound*
- ◆SMARTEST ANSWER MACHINE
- ◆AUTODIAL-DATABASE
- ◆VOICEPAD™ - *Voice for your Programs*
- ◆PROGRAMMER'S TOOLKIT *(optional '79.95)*

½ card, software, cables, & speaker
$269.00 + S s/h
(415) 652-9600
Talking Technology, Inc.
4383 Piedmont Ave. Suite B
Oakland, CA 94611
CIRCLE 848 ON READER SERVICE CARD

CHIPCLOCK™

10-year clock/calendar IN A CHIP!
Easy plug-in ■ 10-year battery
Never set date/time again
No slot needed ■ 100% compatible
NOW WORKS WITH PS/2
CHIPCLOK w/software NOW $49.00
30-day money-back guarantee
COMPUQUEST INC.
801 Morse Ave. ■ Schaumburg, IL 60193
1-800-722-2353
1-312-529-2552 in IL
CIRCLE 553 ON READER SERVICE CARD

MotherBoard Clock - $59
SideClock does not waste an expansion slot! The innoventions' clock/calendar enters the time and date for you automatically. Easy installation. Software & user-replaceable battery included. 30 day $-back gtd. 2 yr warranty. For XT, PC, PS-25 & compatibles. $59 + $3 s/h. Site discount. Dealers welcome.
ARISTO Computers, Inc.
6700 SW 105th Avenue, Suite 307
Beaverton, OR 97005
503/626-6333 or 800/3ARISTO

TO PLACE YOUR AD
IN PC Magazine
Classified Marketplace
Call (212) 503-5115

COMMUNICATIONS

IBM compatible XT computer with turbo / 640 memory, serial, parallel ports, keyboard, mono monitor ... $795.00
Computer Fax system using above computer. Fax card, software, and scanner ... $1595.00
Automated telephone attendant and voice messaging system with above XT compatible computer. $1195.00
Hewlett packard laser jet printer II ... $1625.00
Okidata, Cannon laser printers ... CALL
Toshiba Laptop Computers
T1000/T1100 ... $799/1395.00 and T1200/3100 $2225/2625.00

SCANNERS
PC Complete hand scanner with software $245.00
Sharp Scanner 300 DPI halftone with card & paint brush software PCMAC. $795.00
Panasonic SF 505 Scanner ... CALL

Sharp FO 300/500	$1195/$1475
Sharp FO 700	$1695
Sharp UX140/180	CALL
Toshiba 3010O/3300	$1088/1240
Toshiba 3700	$1375
NW Bell Fexline	$1175
Sanyo 100/515	$1195/1575

Fax Machines and Fax paper best price nationwide

Ricoh 10/20/80	$1220/1550/Call
Canon Fax 20	$1278
AT&T 3500/3510	$1395/1585
AT&T 3520/3530	$1695/2850
Panasonic KX-F11	$1345
Murata M1200/M1600	$725/$925

Terms: prepayment prices Visa/MC/DD 3% restock 20%
Telephone Product Center @ Tera, CA 92630
714 730 6666, FAX 714 6702760

CIRCLE 555 ON READER SERVICE CARD

Communications *continue on following page . . .*

PC MAGAZINE

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

MARKETPLACE

COMMUNICATIONS

2400bps Internal Moden PS/2

- FOR IBM PS/2 MODEL 50, 60, 80 AND COMPATIBLES
- 2400 BAUD WITH AUTOMATIC FALLBACK TO 1200 AND 300 BPS
- EXTENDED HAYES "AT" COMMAND SET
- BELL 103 and 212A and CCITT V.21, V.22 AND V.22BIS-MODES
- SOFTWARE SELECTABLE AS COM1 THROUGH COM8
- AUTO-CONFIGURE FILES INCLUDED
- INTRO PRICE $369

To Order: **617-753-3537**
New area code as of July 16 - (508)
Or Write To
CEPPI TECH.
12A Brookside Place
Shrewbury, MA 01545

CIRCLE 838 ON READER SERVICE CARD

PC-HOOKER

A powerful and easy to use connectivy tool that lets you hook together any two IBM PC compatible computers and transfer files in either direction at speede exceeding 115,000 baud.

Faster than Lap-Link™
Easier than Bridge

- Connects any two PCs
- Serial and parallel
- Exceeds 115,000 baud
- Two way transfers
- DOS organizer
- Full text editing
- Talk mode
- Hayes modem support
- Print facility
- Universal cable
- 5¼" and 3½" disks
- PS/2 ready

Complete only $59.95

To order call 1-800-888-8455

AMICA

102 S. Main Street Park Ridge, IL 60063

Lap-Link is a trademark of Traveling Software, Inc.

CIRCLE 572 ON READER SERVICE CARD

COMPUTER SYSTEMS

1988 BEST BUY

Case, MB, XT 150 ps, AT 200 PS
Phoenix Bios

- 12 MHZ XT $230
- 12 MHZ AT $485

Case, MB, XT 150, PS, AT 200 PS, XT 360K, AT 1.2, Controller, PH Bios

- XT 12 MHZ $330
- AT 12 MHZ $710

Min. Order - 3 ea

512-467-2330
ADVANCED MICRO TECHNOLOGY
CIRCLE 802 ON READER SERVICE CARD

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

COMPUTER SYSTEMS

COMPUTER SYSTEMS

WYSE
WYSEpc 286

2108-8MHz	$1,125
2112-12MHz	$1,525
2200-10MHz	$1,325
2214-12.5Mz	CALL
386-16MHz	CALL

LAPTOPS
TOSHIBA

T1000	$845
T1100	$1,399
T1200	
T3100	CALL

HARD DRIVES

SEAGATE		MINISCRIBE	
20MG	$245	20MG CARD	CALL
30MG	$295	30MG CARD	CALL
40MG	$485	27MG	$625
65MG	$575	45MG	$699
80MG	$995	71MG	$899

NEC PRODUCTS

MULTISYNC II	CALL
MULTISYNC PLUS	$850
MULTISYNC XL	CALL
MULTISYNC GS	$199
MULTI. WHITE	CALL
GB1 COLOR BD.	$299
1024 VIDEO CARD	CALL
PORTABLES	CALL

BEST PRICES
PRINTERS

EPSON	CALL
PANASONIC	CALL
TOSHIBA	CALL
NEC	CALL
STAR	CALL
CITIZEN	CALL
ALPS	CALL
LASERS	CALL

ADD ON'S

XT EXP.MEM	$95
XT I/O w/ser/par	$89
AT EXP MEM	$199
AT I/O w/ser/par	$85
HERC. COMP.	$75
COLOR GRAPH	$75
EGA	$185
VGA	$250

SPECIALTY ITEMS

MW200 UNIVERSAL I/O BOARD
- 16 EIGHT BIT ANALOG OUTPUTS
- 14 HIGH VOLTAGE / CURRENT OUTPUTS
- 1 ANALOG OUTPUT
- PLUS PROTOTYPING AREA
- 10 PROGRAMABLE DISCRETE INPUTS/OUTPUTS

MW777 MULTI FLOPPY DISK SWITH
A SWITCH BETWEEN 3.5 AND 5.25 DRIVES. ALLOWS USER TO HAVE MORE THAN 2 FLOPPIES IN HIS SYSTEM, KEEP TWO 5.25 AND ONE 3.5 OR VICE VERSA.

MICRO WORLD ELECTRONICS
SALES 1-800-288-8088 SUPPORT 1-303-988 5907
PRICES SUBJECT TO CHANGE: MC, VISA. ACCEPTED
CIRCLE 557 ON READER SERVICE CARD

IBM

Model 30 8mhz 640k 2/3.5"	$1275
Model 30 8mhz 640k 20mb	$1695
Model 50 10mhz 1m 3.5 20mb	$2595
All Other Models Available	$ call

COMPAQ

Deskpro 256k 2 Drive	$1295
Deskpro/286 640k 1.2 20mb	$2495
All Other Models Available	$ call
8mhz XT 640k 2dr mono	$ 695
10mhz AT 512k 1.2 20mb	$1195
Peripherals & Software	$ call

We Will Beat Any Price On Stock Items

P C TECHNOLOGIES
(312) 430-2800
CIRCLE 559 ON READER SERVICE CARD

LAPTOP SPECIALS

ZENITH • TOSHIBA • NEC • SHARP • DATAVUE

The Latest Laptops at Low Prices along with a wide Selection of Accessories including . . .

- **AFFORDABLE 5¼" or 3½" EXTERNAL and INTERNAL DRIVE UNITS for**
- **LAPTOPS and DESKTOPS (360K, 720K, 1.2K and 1.44K).**
- **DICDNIX PRINTERS . . . 1200 AND 2400 BAUD MODEMS for LAPTOPS.**

For Low Pricing and Fast Reliable Service call

COMPUTER OPTIONS UNLIMITED
for the Smart Buyer
201-469-7676 • 7 Days
9AM-10PM (EST)
CIRCLE 558 ON READER SERVICE CARD

Buy Wholesale FROM #1USA COMPUTERS & ELECTRONICS
TOP NAMES — BEST PRICES — SUPPORT & SERVICE "Call Now"
MEMBERSHIP $25 OFF THIS MONTH 1—800 777—1USA

COMPUTER SYSTEMS

Simply Put, It's The Fastest AT On The Market.

(Norton S.I. 18.7)

FEATURES: 286-16MHz

AT Mainboard
- Phoenix BIOS
- 80286 - 16 AMD Microprocessor
- 0 Wait States
- 8 I/O slots two 8 bit six 16 bit
- Expandable to 1 Megabyte on board
- CMOS clock and calendar circuit
- 24 bit addressing and 16 bit data path
- 16 level interrupt
- 7 channel direct memory access
- 3 programmable timers

AT Case
- 2 Drive or 3 Drive openings available
- Hardware reset switch
- 8/16 Mhz speed select switch
- 1.5 mm thickness
- Power, Hard Disk and Turbo indicators

AT Power Supply
- 115/230 VAC user selectable
- 220 Watt output rating
- Soft Start
- Overvoltage and overload protection
- Over 20ms hold up time
- UL, CSA and FCC Certified

AT Keyboard
- Enhanced 101 Key keyboard
- 12 Function keys and separate keypad
- Solid state capacitance low profile key switches
- Electronic shiftlock with LED indicators

Only ...
$729

Data Bank Computer
196 Whitney Place
Fremont, CA 94539
(415) 490-5002
In Canada Call ...
(514) 631-3191

CIRCLE 585 ON READER SERVICE CARD

$$$$ LOWEST PRICE $$$$

HARD DRIVES

SEAGATE 20MB KIT
ST-225, CONT, CABLES **$249**

SEAGATE 30MB, ST-238 ..... $249.50
SEAGATE 40MB, ST-251 ..... $359.50
SEAGATE 80MB, ST-4096 **$669**
MINISCRIBE 40MB, 3650 ..... $329.50

PRINTERS

PANASONIC 1080i II $169.95
PANASONIC 1524 (24PIN) $525.95
Epson, Oki, Fuji, Canon, Citizen $CALL

ADD ON BOARDS

NEC GB-1 640X480 ..... $235.95
ATI EGA WONDER $189.95
Mono Graphic Card W/Par. Port ..$49.50
Color Graphic Card W/Par. Port ..$49.95
FUJITSU 360K Floppy Drive $74.50
FUJITSU 1.2Meg Floppy Drive $85.50
TOSHIBA 3 1/2" Drive (720K) $99.50
LOGITECH Mouse $79.50
EVEREX 2400B Modem ..... $CALL
CPI 1200B Modem W/Software $69.50
200W Power Supply $79.50
150W Power Supply $49.95
101 ENHANCED Keyboard $59.95
CALL FOR OTHER PRODUCTS

MONITORS

SAMSUNG Mono W/T&Swivel $74.95
SAMSUNG Color W/T&Swivel $239.95
SAMSUNG EGA W/T&Swivel $354.95
NEC MULTISYNC II $589.00

SYSTEMS

COMPLETE DTK AT SYSTEM
80286 Intel 6/13 Mhz
40 Meg H. Drive, 1.2 FD **$1349**
640K RAM, Monitor & 101 Keyboard

ONE YEAR WARRANTY
All prices are subj to change

(713)988-6566
(818)915-5495

C.O.S.
9898 Bissonnet, Suite 265
Houston, TX 77036

CIRCLE 829 ON READER SERVICE CARD

THE LOWEST COMPUTER PRICES FOUND ANYWHERE!

LOOK! AT&T - PC 6386:
IBM RAM, 1.2 MB FDD, 40 MB--$4,995.
LOOK! AT&T - PC 6386 (Without 40 MB):
--$3,995.
LOOK! IBM XT & AT's:
Starting at only --$1,200.

Ask for low, low prices on other products from AT&T, IBM, Digital, Mini's, Mainframes, etc., and charge all of your computer related purchases at only 12.75% APR on the WORLDCARD℠ credit card!

CALL
(801) 562-1404 or
1-800-228-0640

COM/SOFT INTERNATIONAL
(A Division of WORLDWIDE SERVICES)

CIRCLE 560 ON READER SERVICE CARD

BEST SYSTEM BUY

STI 88 ..... $499
4.77/10MHz/0 wait/640K RAM
360K FDD/FDD Controller/KB
clock/calendar/1 serial, 1 parallel &
1 game port/150W power supply

STI 286 ..... $980
6/10 MHz/640K RAM/200W
Enhanced KB/1.2 M8FDD
WD Dual FD/HD Controller
clock/calendar/BIOS

STI 386 ..... $2,595
With 40MB HDD

Other peripherals
also available — CALL

Summit Technology
P.O. Box 201702, Austin, TX 78720-1702
(512) 335-0522
1-800-445-8640

CIRCLE 562 ON READER SERVICE CARD

Radio Shack-Tandy

Our 10th year of **DISCOUNTS**
COMPUTERS &
CELLULAR PHONES
Fgt. Prepaid. Save Tax
Toll Free **800-231-3680**

We will meet or beat . . .
GUARANTEED LOWEST PRICES

MARYMAC INDUSTRIES INC
22511 Katy Fwy.
Katy (Houston) TX 77450
1-713-392-0747 Telex: 774132

CIRCLE 561 ON READER SERVICE CARD

TO PLACE YOUR AD
IN PC Magazine
Classified Marketplace
Call (212) 503-5115

IBM PS/2's

Up to 41% off!

	Retail	Your Cost
MODEL 50-386	(New)	$Call
MODEL 60-041	5,295	3,395
MODEL 60-071	6,295	3,850
MODEL 80-041	6,995	4,395
MODEL 80-071	8,495	4,995
MODEL 80-111	10,995	7,895
MODEL 80-311	13,995	9,995

American Micro Computer Center
2890 Griffin Road - Suite # 4
Ft. Lauderdale, FL 33312

(305)985-9406

CIRCLE 564 ON READER SERVICE CARD

Radio Shack-Tandy

COMPUTERS
PRINTERS
CELL-PHONES
FAX-UNITS, etc.

SHOP AROUND . . . BUY HERE

NATIONAL

COMPUTER WAREHOUSE CLUB
1200 HWY 377, GRANBURY, TX 76048
Cust. Serv. (817) 573-0220

CALL TOLL FREE **800-433-SALE**
(24 Hrs.) FAX: (817) 573-0237

CIRCLE 570 ON READER SERVICE CARD

DISK DRIVES

8 INCH DISKETTE SYSTEM

Read, write, and format diskettes from IBM mainframes, minicomputers, data entry equipment, etc. Complete easy to use software handles EBCDIC conversion. Can read and write CP/M 8-inch diskettes (many formats). You also can use 8-inch drives for PCDOS files. 1200 KB per diskette! $1095 complete.

MICROTECH EXPORTS
223 Forest Avenue
Palo Alto, CA 94301
415-324-9114

DISK DRIVES

HIGH PERFORMANCE LARGE CAPACITY

DISK DRIVES

150 Mbyte Package $3,195
320 Mbyte Package $4,495

- 16 msec. access time
- Supports DOS, Xenix, UNIX on AT's and 386's
- EDSI controller, cables, mounting hardware
- 1 year swapout with **FREE** hotline support

CALL:
1-800-922-9050
(In Texas, 512-346-8360)

Ten X Technology, Inc.
4807 Spicewood Springs Rd., Bldg. 3 · Austin, TX 78759
CIRCLE 779 ON READER SERVICE CARD

OPTICAL DISKS

LASERDRIVE
as featured in PC WEEK 4/26/88
- 800MB storage on single disk
- connecting to any host via SCSI interface
- Plug 'n Play to any operating system

only $4995 Limited time only

PANASONIC LS5000
$2495 - 200 MB

OPTICAL MEDIA
For IBM & Panasonic Optical Drives · $52

We carry a full line of 51/4" & 12" Optical Drives

SKAN TEKNOLOGIES, INC.
optical storage systems
(212) 809-5570 (516)295-2237
CIRCLE 775 ON READER SERVICE CARD

ST4096 $639
80MB 28ms

Micropolis	71MB	28ms	$649
Miniscribe	71MB	28ms	$669
ST251	40MB	40ms	$359
ST251-1	40MB	28ms	$425
ST125	20MB	3.5 w/ CONT	$270

CPU INC (714) 870-9033
CIRCLE 849 ON READER SERVICE CARD

TO PLACE YOUR AD IN PC Magazine Classified Marketplace Call (212) 503-5115

PS/2 and Laptop Compatible Systems

- **5.25" 360K or 1.2Mb External for PS/2** models 25 30 50 60 80 Easy setup professionally built 360K *(#28 EXPS)* **$280.00** 1.2Mb *(#29 EXPS)* **$310.00**
- **1.44Mb 3.5" drives** read write format both 720K and 1.44Mb formats Teac and Toshiba 1.44Mb w/frame *(#19 IHD)* **$159.00** External 1.44Mb case power supply cable *(#20 EHD)* **$275.00**
- **720K 3.5" Toshiba drives w/kit** *(#1 ND352T)* **$139.00**
- **Compaticard floppy disk controller** for PC/XT AT 386 Adds 4 floppys of any kind 1.44 1.2, 720, or 360K to your computer Software included *(#10 HDC)* **$150.00**
- **5.25" 360K External** for all Toshiba laptops and Zenith 181-92 and 93 laptops Toshiba models *(#8 SPW)* **$235.00** Zenith models *(#11 ZPW)* **$245.00**
- **Adaptec 2372 RLL controller** 2 hard 2 floppy, sustained 1:1 interleave **$220.00**

Call TOLL FREE: 800-544-4252 CA & tech info **(619) 589-1818**
MicroSense 5580 La Jolla Blvd, Suite 313, La Jolla, CA 92037

DISK UPGRADE BIOS FOR ATs
DUB-14 overrides AT Drive Table to allow any compatible drive to be attached and fully used with standard AT controllers. Short card uses one half slot. Includes complete Set-Up routine and low-level format facility. Works UNIX, XENIX, PICK, other OS and networks. NOVELL is fully supported. $95 + $3 shpg. CA Tax.

GOLDEN BOW SYSTEMS
2870 Fifth Avenue Suite 201
San Diego, CA 92103
800-284-3269

PS/2 DRIVES FOR PC'S AT'S

CompatiKit-PC	$329
CompatiKit-AT	$309

Built-in floppy controllers no problem. Supports multiple drives and formats. Lets your computer use IBM PS/2 1.4M diskettes plus more. Call for further information.
VISA/MC/COD/CHECK.
MICRO SOLUTIONS COMPUTER PRODUCTS
132 W. Lincoln Hwy
DeKalb, IL 60115
815-756-3411

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

DISKETTES

Why waste your time formatting disks?

Preformatted disks save you time and money!

Memorex • Nashua • 3M
5¼" (from 48¢) • 5¼" HD • 3½" • 3½" HC

Call toll-free TODAY!
1-800-321-4668
In Colorado (303) 234-0871. Open 8:00 to 5:30 Mountain Time, Monday—Friday.

ALF
ALF Products, 1315F Nelson St, Denver, CO 80215
CIRCLE 574 ON READER SERVICE CARD

DISKETTES

DISKAMERICA

5.25 DS/DD DISKETTES

25¢ EA.

100% MONEY BACK GUARANTEE!!!

FREE!!! LABELS, SLEEVES & WRITE PROTECT's
NO HIDDEN COSTS
MINIMUM ORDER-100 DISKS
SHIPPING AND HANDLING $4.00 Per Box
VISA, MASTERCARD, AMEX, DISCOVER & COD

HOURS: WEEKDAYS 8 AM to 11 PM EST; SATURDAY 9 AM to 7 PM

1-800-634-2494

24 HOUR SHIPPING

CIRCLE 565 ON READER SERVICE CARD

AMERICAN GROUP

5 1/4" DS DD 29¢ ea.
INCLUDES SLEEVES & LABELS
MIN. QNTY 200

100 LIFETIME WARRANTY

3 1/2" DS DD (min 25)	1.10 ea.
5 1/4" DS HD (min 30)	.69 ea.
5 1/4" DS HD (Color)	.90 ea.
5 1/4" DS DD (Color, min 100)	.45 ea.

Visa/MC accepted
12132 Sherman Way
N. Hollywood, CA 91605
Shipping $4.00 per min order/$2.00 each additional lot

(818) 765-3040

CIRCLE 778 ON READER SERVICE CARD

FIND THE WIDEST RANGE OF DP WORKSTATIONS, ACCESSORIES & SUPPLIES IN THIS FREE GLOBAL GUIDE DIAL 1-800-8-GLOBAL

GLOBAL COMPUTER SUPPLIES

45 South Service Road, Plainview NY 11803

CIRCLE 581 ON READER SERVICE CARD

IT'S NOT 29¢ PLUS THIS AND THAT, IT'S

29.¢

With sleeves, tabs, labels

		EACH
5¼"	5¼" DS/DD Min 100	29¢
	Min 50	29¢
	Color 5¼" DS/DD Min 50	49¢
	5¼" IBM-AT HD Min 50	79¢
	Box of 10 Min 10 boxes	
	5¼" DS/DD	$4.29
	Box of 10 Min 5 Boxes	
	Color 5¼" DS/DD	
	Free Plastic Case	$5.99
3½"	3½" SS/DD	
	Min 25 Subject to availability	99¢
	3½" DS/DD	
	Min 25 Subject to availability	$1.09
Data	20S 40 MB Mini Cartridge	
	3m DEI Compatible Min 5	$15.90
	60D 120 MB Data Cartridge	
	Min 5	$19.20

Immediate shipping—Guaranteed satisfaction
Call for greater discounts on larger orders
100% Lifetime Warranty
Shipping $3.50 per min. order $1.50 each addl. lot
MC VISA accepted

1-800-537-1600
Operator # 67

MEP

Dept. No. 1523 P.O. Box 61000
San Francisco, CA 94161

CIRCLE 564 ON READER SERVICE CARD

TAKE THE BYTE OUT OF DISK PRICES.

.29¢

Media Source soothes the sting when purchasing your diskettes. All of our disks are fully certified. Each disk has an unrestricted lifetime warranty. There are no hidden costs. All diskettes come with labels, sleeves and write protect tabs.

Generic 5¼"
Double sided, double density
Boxes of 100 29 ea.

Generic 5¼"
High density, 96 TPI,
Boxes of 50 $1.29 ea.

Sony 3½"
Single sided,
Boxes of 50 $1.09 ea.
Double sided,
Boxes of 50 $1.59 ea.

Dysan 5¼"
Double sided, double density,
Boxes of 50 99 ea.

media source

Order by phone 1-800-356-2553 or 404-952-2990. We accept MasterCard, VISA, American Express & Discover Cards. COD available. 24 hour shipping. Next day air available. $4.00 per box shipping and handling.

CIRCLE 563 ON READER SERVICE CARD

DISKETTES!

5.25" DS/DD *In Stock*

29¢ ea. (qty of 100)

With Sleeves, Labels, & WP Tabs
Tyvek Sleeves add 4¢

3.5" DS/DD *In Stock*

$1.19 ea. (qty of 100)

With Labels
$1.29 ea. qty of 50
$1.39 ea. qty of 25

FREE shipping for orders over $100; otherwise $3.50.
VISA/MC, Check & MO accepted.
Orders ship in one business day!
Disks are 100% certified DS/DD.
C.O.D. orders add $2.50.
Ohio orders add 5.5% sales tax
ADD'L PRODUCTS AVAILABLE!

TO ORDER CALL TOLL FREE
Monday-Friday, 9am-7pm EST

1-800-288-2887

DIRECT MICRO
1776 Dividend Drive
Columbus, OH 43228
(614) 771-8771

CIRCLE 785 ON READER SERVICE CARD

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

EXPANSION UNITS

AT TOWER

BRAND NEW!! AMERICAN MADE
FITS AT MOTHERBOARD / EIGHT H/H DRIVE SLOTS / 250 W POWER SUPPLY

enclosure technologies, inc.
P.O. BOX 67275 CANTON, MI 48187
(313) 459-3557
CIRCLE 571 ON READER SERVICE CARD

CALL DRAM CO.

— Lowest Price in Market
— Volume Discounts
— 100% Guaranteed

Dynamic RAMS
1M 120NS, 150NS, DIP & SOJ
256K 150NS, 120NS, 100NS & 80NS
64K 150NS, & 120NS
Policy: Price subject to change. Min. order $20, MC/VISA add 4% CA residents add 6.5% sales tax UPS. Ground $5, air $7 (1 lb)
Call for lowest price in the market
(415) 398-2987
Open M-F 9-6
P.O. Box 580127 SF, CA 94158-0127

CIRCLE 566 ON READER SERVICE CARD

EXPANSION UNITS

DYNAMIC RAMS

1Mbit	100,120ns	CALL!
51258	100ns	$12.50
41256	70,80,100	CALL!
41256	120ns	CALL!
41256	150ns	$11.75
41264	150ns	$16.00
41464	150ns	$ 9.50
4164	100,120,150	CALL!

Please Call for ZIP, PLCC and more!

PROCESSORS		E. PROMS	
80387-20	$750.00	27C101-25	$24.00
80387-16	$495.00	27C512-20	$15.00
80287-10	$285.00	27512-25	$12.95
80287-8	$235.00	27C256-25	$ 5.50
80287-6	$189.00	27256-25	$ 4.95
8087-1	$169.00	27C128-25	$ 5.25
8087-2	$149.00	27128A-20	$ 5.00
8087	$109.00	27128A-25	$ 5.25
80386-16	$ CALL!	27C64A-20	$ 4.95
V-30 8mhz	$ 12.75	2764-25	$ 3.50
V-20 10mhz	$ 17.00	2732A-25	$ 4.50
V-30 8mhz	$ 5.50	2716	$ 4.50

S. RAMS.

4364-15 $12.75

43256-12 $18.95 6116-15 $ 9.75

I.C. EXPRESS

15356 Valley Blvd., City of Industry, CA 91746 Phone: 818 369 2688

Outside CA (800)892-8889 (Mon.-Fri. 8-5pm PST) (800)882-8181 CA

CALL FOR CURRENT PRICES & VOLUME DISCOUNT ALL MERCHANDISE IS 100% GUARANTEED

Prices shown for cash discount. MasterCard/Visa add 3%. Prices are subject to change. Prepaid order call for confirmation #

California residents add 6.5% sales tax. Shipping & handling: UPS Ground $5.00, UPS Air $7.00 (under 1 lb.)

CIRCLE 582 ON READER SERVICE CARD

Your system works! Finally!

Don't scrap it...

Keep it growing with PC-XTRA

6 SLOT EXPANSION CHASSIS

PC-XTRA makes room for the add-ons you need for continued growth.
No hardware modification! No software changes!

Made in U.S.A.

$449.00

only ~~$549.00~~ f.o.b. Santa Ana

California residents add 6% sales tax

PC HORIZONS, INC.

1710-M Newport Circle, Santa Ana, CA 92705
(714) 953-5396 CIRCLE 567 ON READER SERVICE CARD DEALER INQUIRIES INVITED

Name Brands ★ Low $$

EXPANSION BOARDS
AST Sixpackplus(64-384K) $129
Sixpack Premium (256k-1M) $209
Advantage (128k-1.5M) $249
Rampage (64k-2M) $209
Rampage 286 (512k-2M) $419
Intel Above PC (64k-2M $229
Above PC PS (64k-2M) $259
Above 286 (512k-2M) $379
Above PS 286 (512k-2M) $409
Above Board 2 for PS2 50/60 (0k-2M) $275
Inboard 386 PC (1M) $789 AT (0k) $949
Quadboard (0-384k) $129
GRAPHICS CARDS
HERCULES Mono $189; . . . Color . . $159
QUAD Prosync $199 . VEGA Dix . . $199
ATI EGA Wonder $199
HARD DRIVES
SEAGATE Kits from 20mb $299
MINISCRIBE Kits from 20mb $299
PLUS Hard cards . . . . . from $539
MEMORY 64k, 256k $call
FLOPPY DRIVES: Toshiba for PC, AT $99 . 1.2MB $119 . 3.5" . $129
External 5-¼" drives for PS2 . . . . $299
COMPUTERS..AST, SAMSUNG
Tape Backup..Maynard, Everex

VLM Computer Electronics
10 Park Place, Morristown, NJ 07960
(201)267-3268 •Visa, MC, Check or COD

ICs PROMPT DELIVERY!!!
SAME DAY SHIPPING (USUALLY)

DYNAMIC RAM

SIMM	1048Kx8	100 ns	$450.00
1Mbit	1048Kx1	100 ns	36.50
51256	256Kx1	100 ns	11.25
41256	256Kx1	60 ns	11.50
41256	256Kx1	80 ns	11.50
41256	256Kx1	100 ns	11.50
41256	256Kx1	120 ns	10.95
41256	256Kx1	150 ns	10.75
41264	64Kx4	120 ns	13.95

EPROM

27C1000	128Kx8	200 ns	$37.50
27C512	64Kx8	200 ns	14.95
27256	32Kx8	250 ns	7.50
27128	16Kx8	250 ns	6.95

STATIC RAM

43256L-12	32Kx8	120 ns	$16.50
6264LP-12	8Kx8	120 ns	10.50

OPEN 6½ DAYS. 7 AM to 10 PM SHIP VIA FED EX ON SAT

WE EXPORT ONLY TO CANADA, GUAM, PUERTO RICO & VIRGIN ISLANDS

SAT DELIVERY INCLUDED ON FED-EX ORDERS RECEIVED BY 9a.m. @ 1 lb. thru 5 lbs. $15.00 1 lb.

Master Card VISA or UPS CASH C.O.D.

Factory New, Prime Parts

MICROPROCESSORS UNLIMITED, INC.
24 000 S. Peoria Ave.
BEGGS, OK 74421

(918) 267-4961

TEL and telegraphic orders. Please note that prices are subject to change. Shipping & insurance extra. 4 up on $. No posting machines. Orders received by 4 PM CST can usually be delivered the next morning via Federal Express Standard Air. $5.00 C.O.D. charge. Minimum order $25.00. Prepaid orders sent via Priority Mail. $4.00

CIRCLE 585 ON READER SERVICE CARD

PERIPHERALS

MAINFRAME TAPE SYSTEMS

for PC/XT/AT/PS2 and MAC!

Our "Tape Connection" products can read and write your 9-track 1/2" 800/1600/6250 BPI magnetic tapes from mini and mainframe computer systems using your PC. We have developed dozens of transfer programs and manufacture many models of tape controller cards and cables. We sell hundreds of systems each month and offer our customers the lowest prices, best service and technical support. Call us today for the best price on tape drives from ANRITSU, CIPHER, KENNEDY, and QUALSTAR. Dealer and volume discounts available!

1120 KAIBAB • FLAGSTAFF, AZ 86001
(602) 779-3341 • TLX 705609

FLAGSTAFF ENGINEERING

9-Track Tape Subsystem

MINISTREAMER™

Now you can exchange data files between your IBM PC/XT/AT and any mainframe or mini-computer using IBM compatible 1600 BPI 9-Track tape. Unit can also be used for disk backup. Transfer rate is up to 4 megabytes per minute on PCs and compatibles. Subsystems include 7" or 10 ½" streaming tape drive, tape coupler card and DOS or XENIX compatible software.

Prices start at $2,995.

QUALSTAR

9621 Irondale Avenue
Chatsworth, CA 91311
Telephone: (818) 882-5822

CIRCLE 573 ON READER SERVICE CARD

SAVE ON

9 TRACK TAPE SYSTEM

FOR IBM PC XT AT

- Msinframe to PC Dsta Transfer
- High Speed Backup
- All Softwsre Complete System
- Service snd Support, easy Installation

call **(818) 343-6505** or write to **Contech Computer Corp.**
P O Box 153 Tsrzana, Calif 91356

CONTECH

CIRCLE 575 ON READER SERVICE CARD

PERFORMANCE PERIPHERALS for TOSHIBA LAPTOP COMPUTERS

- 2400 bps Expansion Card Internal Modem with RJ11 and DB-9 COMMS-2 ports (for the T3100, T1200, T1100+, T5100) M24E **$499**
- 2400 bps Internal Card Modem with RJ11 and DIN 8-pin Acoustic Coupler jacks (for the T1000) M24I **$449**
- COMMS-2 Expansion Card: S232E **$199**
- Internal Card (T1000) S232I **$149**
- AdaptaPAK 12V battery power adapter and rechargeable pack (T3100) P80 . . . **$399**

(See FIRST Looks, 2/16 PC Mag, pg. 52)

PRODUCT R&D Corporation
1194 Pacific, San Luis Obispo, CA 93401
Phone **(805) 546-9713** FAX **(805) 546-9716**
CIRCLE 578 ON READER SERVICE CARD

PS/2 I/F FOR 9 TRACK TAPE

Nova Stor has the I/F to the PS/2 models 50, 60 and 80. We can connect 1600 and 6250 BPI tape drives to the PS/2 with our SCSI I/F. Our software allows the conversion and transfer of data from IBM or ANSI tapes. Our backup program allows selecting files or the whole hard disk and can be multi-vol

NOVA STOR CORPORATION
31828 VILLAGE CENTER ROAD
WESTLAKE VILLAGE, CA 91361
(818) 707-9900

Plotters

begin on following page . . .

PLOTTERS

INTRODUCTORY OFFER $1,695.00 Call Now!

The Zericon Model 3600-D Plotter Astounding price and performance for only $2295.

Zericon dares to compare value

- **Price:** a full $1,000 less than our nearest competitor
- **Compatibility:** operates with all popular CAD software supporting DM/PL™
- **Speed:** at 7 inches per second, the 3600-D offers the best price-performance ratio in its class.
- **Repeatability:** .001 inches assures you of drawing quality you can be proud of.
- **Unique:** X & Y axis scaling allows you to calibrate to 1 part in 10,000. Ideal for applications where scale is critical
- **Vacuum** paper hold down assures perfect registration.

CALL NOW AND WE'LL SEND YOU A FREE SAMPLE PLOT
(415) 490-6180

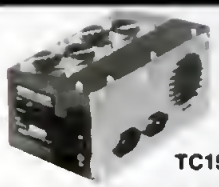
Dealer inquiries invited.

ZERICON

CIRCLE 981 ON READER SERVICE CARD

POWER/COOLING SUPPLIES

TURBO-COOL 150: Cool, Quiet Power



TC150

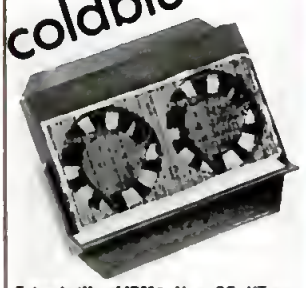
MODEL	POWER	COOLING	NOISE	PRICE
STANDARD XT	150W	1.0X	STD	$69
STANDARD AT	200W	1.0X	STD	$125
SQ150 PC/XT	150W	1.4X	−64%	$129
SQ200 AT	200W	1.1X	−69%	$169
TC150 PC/XT	155W	2.2X	−50%	$149
TC200 PC/XT	200W	2.7X	STD	$189
TC250 AT	250W	1.8X	STD+	$189

FCC UL 120V/240V 4 drive plugs heavy duty components patented cooling system 1 year warranty

PC COOLING SYSTEMS, INC.
31510 Mountain Way Bonsall CA 92003
(619) 723-9513 VISA/MC/COD/PO

CIRCLE 577 ON READER SERVICE CARD

coldblue™



Extends life of IBM®. Your PC, XT or AT computer will run up to 27° cooler with **coldblue™** tucked inside, directing airflow to the cards. It really works! Fits clones, too. One-year warranty
PC, XT 3-speed-model — $185.
New AT model — $149.

Mandrill Corp., P.O. Box 33348,
San Antonio, TX 78265
(800) 531-5314, (512) 341-6155

CIRCLE 790 ON READER SERVICE CARD

SPEED DEVICES

IBM-AT SPEEDUP

The High Performance *SpeedInjector*™

XCELX 286/287

Will run *any* IBM AT faster. Average speed for a 6 MHz AT 9.8 MHz! Replaces the CPU's Crystal with a reliable frequency synthesizer for full compatability. Easy plug-in installation.

Features:
For The CPU — 100% continuously variable frequency from 6-14 MHz, selectable while running ▲ Mode Switch for switching between Standard and Variably set speed ▲ Full hardware Reset Switch. **For the 80287** — Independent 80287 speedup ▲ selectable from, Standard 2/3 CPU speed, 6, 10, 12, 14, and 16 MHz actual 80287 speed ▲ The fastest 80287 speeds available

XCELX Models
The Desktop Remote Version — Variable CPU control, Mode Switch and Reset Switch are all conveniently located on an easy-to-use desk-top controller (#XA03-R) $159.95
The Rear Mounted Version — Variable CPU control, Mode Switch and Reset Switch are located on the rear panel of the AT (#XA01-N) $99.95
The *Speed Utilities*™ — Software for the XCELX that will: Display exact XCELX speede, for fine tuning of the CPU speed ▲ Speedup the Hard Disk ▲ Correct Floppy Disk "Drive Not Ready" error ▲ Speedup Keyboard (#SU01-A) $36.95
FAST 80287 — 8, 10, 12, 14 and 16 MHz. Test rated & guaranteed (#MP1) $ Call
FAST 80286 — Replacement CPU for speed above 10 MHz (#CU1-A) $256.95
FAST RAM — 128K & 256K, 100NS & 120NS (#RP1) $ Call
MIL-SPEC Crystals — The Famous Ariel Crystals for old ROM ATs. Choose from (Crystal/CPU Speed) 16/8, 17/8.5, 18/9.5, 20/10 MHz (#CA1-16/17/18/19/20) $18.95

INCREASE OVERALL SPEED — UP TO 300%

ARIEL COMPUTER CORPORATION

TWO-YEAR WARRANTY

Order Line:
800-641-3322 ext. 1110
Direct Line:
201-788-9002

Post Office Box 866 ▲ Flemington, New Jersey ▲ 08822

CIRCLE 596 ON READER SERVICE CARD

PRINTERS

ADD POWER TO YOUR LASERJET II FOR LE$S

Expandable Memory Boards:
1MB - $ 277
2MB - $ 579
4MB - Call

Font Cartridges
Z+ - $ 209
123 - $ 249
B/F - $169

HP Plotter (HPGL) Emulation:
LaserPlotter - $ 129

D.H. SYSTEMS, INC.
5333 McConnell AVE. Los Angeles CA 90066
(213) 822-9484
VISA-M/C

CIRCLE 579 ON READER SERVICE CARD

SECURITY

POWER SURGES ARE THE BIG DESTROYER OF COMPUTERS!
So when SAFEWARE designed the original computer insurance policy, they decided to cover even the notorious POWER SURGES. Today you can buy comprehensive, full replacement protection against theft, accidents, fire, earthquake, water AND power surges for as little as $39 a year. Call for details & immediate coverage 1-800-848-3469.
SAFEWARE, The Insurance Agency Inc.
2929 N. High Street
P.O. Box 02211
Columbus, OH 43202-0211

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

TO PLACE YOUR AD IN
PC Magazine Classified Marketplace
Call (212) 503-5115

SOFTWARE/ACCOUNTING

THE PAYROLL

If you've been looking for a payroll with the power to handle a real job, you just found it. This system is the same one used on the HP3000 super-minis with features you didn't think you could possibly get on a PC....like accruals, 401k plans, user-customized data and special computations, a report writer and more. $600

COURT DIRECTIONS
A COMPUTER SOFTWARE

71591 Biskra Road
Rancho Mirage, CA 92270
(619) 568-4681

CIRCLE 759 ON READER SERVICE CARD

CPA REVIEW

Money-Back Guarantee
You'll PASS the CPA Exam.

Over 2,100 multiple-choice and essay/problems with text solutions from recent CPA exams. The software keeps your scores and tailors your study to the material you need to pass the exam. Continuing Professional Education courses with hour for hour credit also available. Call for brochure and DEMO information

1-800-241-9700
in Colorado: (303) 799-0099
For IBM PC's and compatibles
AMEX, MasterCard, Visa accepted

14 Inverness Dr East F-104
Englewood, CO 80112

MicroMash®

ACCOUNTANT'S CLIENT WRITE-UP $250

- TESTED AND PROVEN IN 100's OF FIRMS
- FAST, EASY TO USE SYSTEM
- FULLY INTERACTIVE MENU DRIVEN PROGRAM WITH HELP SCREENS
- FLEXIBLE CHART OF ACCOUNTS
- UNLIMITED DEPARTMENTS
- COMPLETE FINANCIAL REPORTS
  - Detail General Ledger
  - Income Statement and Balance Sheet
  - Statement of Change
  - Sub-schedules
  - Job Cost and Other Special Reports
- OPTIONAL LOTUS/dBASE INTERFACE
- MINI WORD PROCESSOR
- AFTER-THE-FACT PAYROLL
  - Earnings Records
  - Federal 941's - State U/C Report
  - W-2's AND 1099's
- INTERFACES WITH OTHER PROGRAMS
  - General Ledger/Payroll Writing
  - Inventory/Receivables/Payables
- TELEPHONE SUPPORT
- PRICE $250.00 - INCLUDING PRINTED MANUAL

IBM PC/XT/AT AND COMPATABLES WITH 256K

HOWELL ASSOCIATES
4545 BISSONNET SUITE 280
BELLAIRE, TX 77401
(713) 661-6652

RBASE for DOS Users

- General Ledger
- Account Receivablee
- Account Payables

Includes source code with a 30 day trial period.

The RB- ACCOUNTANT II 299.95
Shipping & Handling 10.00

* RBASE FOR DOS version 2.1 required *

Software Specialist
5820 Princess Dr.
Rockford, IL 61109
815-398-6863

CIRCLE 842 ON READER SERVICE CARD

PC-FUND

The leading fund accounting system for local govts and non-profit organizations. Modules include General Ledger, Accounts Payable, Encumbrance, Obligation Tracking, Accounts Receivable, Payroll, Budgeting, Fixed Assets and Donor Receipts. The system supports up to 99 funds, 9999 depts. PC-FUND runs on the IBM-PC and most MS-DOS and XENIX computers.
AMERICAN FUNDWARE, INC.
P.O. Box 773028
Steamboat Springs, CO 80477
(800) 551-4458 (303) 879-5770

dBASE ACCOUNTING TOOLS

*GENERAL LEDGER *ACCTS PAYABLE
*dINVOICER & A/R *SALES ANALYSIS
*SERVICE BILLING *ORDER ENTRY
*JOB COSTING *JOB ESTIMATING
*PURCH ORD/INVENTORY *PAYROLL
$99 ea + s&h w/dBASE 2, 3 or 3+ Source Code
dATAMAR SYSTEMS
4876-P Santa Monica Ave
San Diego, CA 92107
(619) 223-3344
Visa-M/C-AMEX-Check-COD

DAC-EASY 2.0 ADD-ON

Avoid DAC-Easy reporting limitations. Create free-format financial statements or reports with WordSheet. Interactive report design. What you see is what you get. Direct access to accounting data to produce any report. Easy to learn and use. Works with any laser or printer. $79. Visa/MC
Audimation Corporation
36 Bridlewood Blvd.
Agincourt, ON Canada M1T 1V1
(416) 494-7820

IRIE POINT OF SALE SYSTEM

Fast, flexible Retail/Wholesale management system. Inventory control. Multiple price levels. Automatic price & description look up. Order entry/invoicing. Add/delete entries before finalizing sale. Cash drawer access secured by password. Sales tax summary. Cash receipt journal. A/R. Billing/Statements.
IRIE Systems
3095 South State Road #7 Suite 203
Miramar, FL 33023
305-981-5747

MIP FUND ACCOUNTING

The MIP Fund Accounting System meets the financial and managerial reporting requirements of not-for-profit and governmental organizations. The System features multiple fund and fiscal years, user-defined reports and six levels of account coding. Modules offered: G/L, A/P, A/R, Payroll, Encumbrance, Expenditure Budget, Revenue Budget and Lotus/DBase Interface. MIP FAS is available for IBM XT and compatibles.
MICRO INFORMATION PRODUCTS
505 East Huntland Dr., Suite 340
Austin, Texas 78752
(512) 454-5004 1-800-MIP-FUND

PRO PC-ACCOUNTING

"Best accounting package I've seen yet. I've tried Peachtree, DAC-Easy, MCBS. Thanks for a nice job of programming." writes J.K. of Los Angeles. Accounts Receivable - Accounts Payable - General Ledger - Invoicing - Inventory-time & billing, etc. $139.95 send chk or M.O., or call or write for free 30 day demo system.
PRO SYSTEMS SOFTWARE INC.
P.O. Box 1437
Plymouth, MA 02360
(617) 747-3332

TO PLACE YOUR AD
IN PC Magazine
Classified Marketplace
Call (212) 503-5115

BUSINESS

PC MAGAZINE

QubeCalc™ InstaCalc™

**Get a 10% discount if you mention this ad!!

QubeCalc™ is a powerful 3D spreadsheet that adds pages to allow instant consolidation.

InstaCalc™ is a full power pop-up spreadsheet that lets you cut and paste with your word processor.

PLUS: help screens, import/export 1-2-3 & dBASE, graphics, macros, sorting, linking, and much more! QubeCalc is $69.95, InstaCalc is $49.95 (Check/VISA/MC).

FormalSoft (801)565-0971
Box 1913 Sandy, UT 84091
CIRCLE 770 ON READER SERVICE CARD

SOFTWARE FOR FREELANCERS!

Features: Expense Tracking, Invoicing, Contact File & Mailing List. Bill your expenses, track leads, make tax prep a snap! Easy to use and customize; full manual; no accounting jargon. Try it for $40 (NY add 8.25%); just $90 more to keep it. "30-day NO-RISK GUARANTEE." (Uses 415K)
"Tony Stewart's HOME OFFICE"™
309 West 109th Street, No. 2E
New York, NY 10025
(212) 222-4332

PC ORDER PAD

Smarter than a Cash Register. Handles Cash and Charge sales. Prints Receipt/Picking slip. Reports Sales totals with margins. Tracks inventory. Easy & Fast. On-line HELP. Options include Bar Code or OCR. Cash Drawer. Network or Remote site versions. Runs under MS/PC DOS. Customizing available. Dealers invited.
COLUMBIA SYSTEMS, INC.
10420 S.E. Hillcrest Drive
Portland, OR 97266
(503) 654-7722

EDITOR'S CHOICE

PC MAGAZINE FACT FILE

Get The Word Out!
Your Product
Has Been Chosen
EDITOR'S CHOICE.

Let us take your article to its highest level of marketing potential with a reprint!

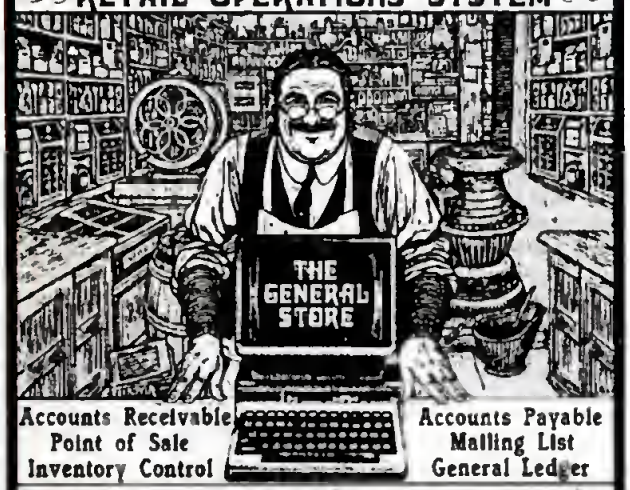
To find out how you can have your article or review elegantly reprinted** on 80 lb. paper stock, in 4-color, 2-color or 1-color, call or write today

Jennifer Locke—Reprints Manager;
Ziff Davis Publishing Company,
One Park Avenue, New York, NY 10016, 212-503-5447

**Minimum quantity 500 reprints.

BUSINESS

THE GENERAL STORE™
RETAIL OPERATIONS SYSTEM



Accounts Receivable
Point of Sale
Inventory Control

Accounts Payable
Mailing List
General Ledger

The old general store sold everything from A to Z. Now there is a retail software system that controls every type retail business from Apparel stores to Zoo gift shops. The General Store system is a reliable, field proven business tool, developed by retail management and computer professionals, successfully serving dozens of different retail businesses. Best of all, it is a complete multiuser business system providing online credit card authorization and support for bar code scanning, electronic cash drawers and specialty receipt printers. For a limited time only $995. Visa and Mastercard accepted. Dealer inquiries invited.

Crichlow Data Sciences, Inc. (804) 426-7628
P.O. Box 6420 Virginia Beach, Virginia 23456

CIRCLE 753 ON READER SERVICE CARD

THE DEPARTMENT STORE OF RETAIL SYSTEMS

TRACK TIME. CAPTURE CASH. NO SWEAT.

timeslips® III

Perfect for attorneys, accountants, consultants, and ALL service professionals. By automatically tracking time and expenses, TIMESLIPS III gives you faster and more accurate billing. The ability to recover cash that could have fallen through the cracks. And a better handle on your own productivity.

- Memory resident, uses 60K RAM
- Tracks time with a "stop-watch"
- Batch enters time/expense data
- Thousands of custom bill formats
- Generates custom financial reports
- Exports data to spreadsheets and databases
- Auto backup, built-in macros

• Optional "Accounting Link" software bridge makes TIMESLIPS III compatible with Dac-Easy™, Peachtree®, Great Plains®, and many other accounting packages.

(Rated 9.3 by InfoWorld)
"TIMESLIPS is the best time and billing system at any price."
—Chicago Tribune

1-800-338-5314 TO ORDER
Call 617-768-6100 for information/rush service.

$199.95 plus $7.00 s/h
Not copy protected. 30-day money back guarantee.

NORTH EDGE SOFTWARE CORP.
239 Western Avenue
Essex, MA 01929

CIRCLE 583 ON READER SERVICE CARD

BUSINESS PROJECT MANAGEMENT

PROJECT MGT. INSIDE 1-2-3

Project Calc creates projects on your 1-2-3 worksheet with 30 new @ functions and menus. Draw Gantt timeline, PERT network and calendar on-screen or thru PrintGraph. Roll up project costs into 1-2-3 budgets and ask "what-if" with schedule or costs. $149.95 with 30-day money-back guarantee.
FRONTLINE SYSTEMS, INC.
P.O. Box 7408-PC
San Francisco, CA 94120-7408
800-451-0303 Ext 55, 916-677-7171

COMMUNICATIONS

TAPCIS & PC-MagNet
Faat, Eaay, and Inexpensive!

TAPCIS is the complete communications program for CompuServe and PC-MagNet. Think, read, type, and edit offline for free. Then go online and see why PC Mag said it "blasts messages onto the screen." (5/87) The favorite among thousands of savvy users and sysops, TAPCIS has it all: a full-featured integral editor with WP/W* commands, time & charges accounting, fast batch downloads, and more.

$79 for disks, manual, and a free hour on CIS. No risk 90 day money-back guarantee. MC/Visa/check/approved purchase order (U.S.). Orders shipped within 24 hours. Supported on CIS in the TAPCIS Forum (GO CIS then GO TAPCIS).

Support Group, Inc.
P.O. Box 1577 (PC7)
Baltimore, MD 21203
(800) USA-GROUP
(301) 889-7863

TAPCIS™

CIRCLE 780 ON READER SERVICE CARD

COMPUTER-TELEX-LINK

Your PC can send and receive telexes quickly and easily with Computer-Telex-Link. Replace that aging telex machine! Add telex service to your business for cost effective worldwide communications! Computer-Telex-Link transforms your PC into a state-of-the-art communications tool for telex.
Cawthon Scientific Group
24224 Michigan Avenue
Dearborn, Michigan 48124
Phone 313-565-4000

COMVIEW PROTOCOL ANALYZER

ComView will turn your PC into a serial data communications analyzer. 64K buffer, control lines, errors, macros, multiple character sets, string search, print, 2-38400 baud, char. count, file save, easy use, flexible configuration. Includes cable/manual. $250, 30 Day Money Back. Demo $10. Visa/MC/COD/POs
THIRD WAVE SOLUTIONS, INC.
P.O. Box 684
Norcross, GA 30091
(404) 923-670[illegible]

COMMUNICATIONS

MULTI-USER BBS

(FOR IBM PC AT)
TEAMate - a mainframe quality BBS. A mini Compuserve. Full screen cursor-controlled interface, topic outline structure, public and private topics, audit trails, xmodem, integrated mail, content retrieval and more. MS-DOS, XENIX and UNIX versions.
MMB Development Corporation
1021 No. Sepulveda Blvd., Suite K
Manhattan Beach, CA 90266
(IN CA) 213-545-1455 800-832-6022

MULTI-LINE PC-DDS BBS

The Bread Board System (TBBS) - secure, reliable, full-featured commercial EIS for IBM XT/AT/386/PS2 or compatible. Easily customized by non-programmers. Kermit, X & Y - Modem. High performance allows up to 32 simultaneous callers. User audit trail. 300/1200/2400/9600 bps.
eSoft, Inc.
15200 East Girard Avenue, Suite 2550
Aurora, Colorado 80014
(303) 699-6565

MULTI-LINE FUN AND GAMES

Run A POP net 'social center.' Up to 23 lines of chat, CB, games such as: traders, adventure, mazer, skunk, liars, poker, blind chess. Graphics for games (w/POP term). Mail and bulletins, of course. Sysop tools for accounts/housekeeping. HW/SW for 7 lines is under $3700. Users pay 60 cents/hr.
KINESIS CORP.
3000 Citrus Circle, Suite 212
Walnut Creek, CA 94598
415-932-1146(v) or 415-932-GAME(m)

CONSTRUCTION

COST ESTIMATING/BIDDING

Powerful, comprehensive system for building fast, accurate and competitive estimates. A complete, stand-alone program. Menu-driven, very easy to use. Over 30 types of reports. IBM XT/AT and compatibles. Hard disk, 512K. dB III version with source code also avail. System $245, demo $15 (CA add tax). CK/MO/COD.
CPR INTERNATIONAL, INC.
2038 Lake Shore Ave.
Oakland, CA 94606
415-268-1948

CONSTRUCTION MANAGEMENT

Affordable, understandable software for builders. Job cost, billing time and materials or percent complete, payables, change order and retention tracking in one package. Prints checks, statements, bids, 30 + reports. Clear manual & help windows, backed by our professional phone support staff. $795.
YARDI SYSTEMS, INC.
930 Laguna Street
Santa Barbara, CA 93101
(805) 965-3[illegible]

DATA BASE

NO FUSS dBASE III PLUS

KADET is a utility incorporating user specified instructions to develop a professional looking database management application in minutes

- *Produces complete menu driven applications*
- *No dBASE programming experience required*
- *Just follow instructions & screen prompts*
- *Report management for 20 reports & labels*
- *Dynamic indexing (virtual sort on 7 fields)*
- *Comprehensive utility & setup menu options*
- *Expansion option for dBASE programmers*
- *Character, Numeric, Date and Logical fields*
- *Supports up to 36 fields per application*
- *Automatic or custom data screen formatting*
- *For flat file (non-relational) databases*
- *dBASE III PLUS™ required (no dBASE clones)*

Only $69.95 + $3.50 shipping & handling. *Indicate if you require KADET on a 3.5" disk.*

Fenfare Computer Services
P.O. Box 1418
Melville, New York 11747
CIRCLE 760 ON READER SERVICE CARD

DON'T BUY CLIPPER™ UNTIL . . .
you see our free dBASE Compiler Evaluation Kit. Contains a demo disk with 8 PRG's and the results of compiling with Clipper, QuickSilver, and FoxBASE PLUS. See for yourself how all three compilers work. Also 15 benchmark tests, detailed brochures, and complete reprints of magazine reviews about all three. FREE. NO OBLIGATION. Call 24 hrs.

FREE
dBASE III+ COMPILER DEMO

dataBASE-Specialties
P.O. Box 2975
Oakland, CA 94618
(415) 652-2790

ROOTS II FOR GENEALOGY
Organize your family tree and print camera-ready family books containing charts, text and indexes. Store, retrieve and display 1,000's of family facts with biographical sketches and source documentation. Lightning-fast searches and sorts. 250 page manual. Satisfaction guaranteed. Write for free brochure. $195 (+ CA tax).
COMMSOFT
2257 Old Middlefield Way, Ste A
Mountain View, CA 94043
415-967-1900

SQL & QBE on dBASE & LOTUS
dQUERY 2.1 is an interactive query system and report writer on dBASE and LOTUS files using SQL (IBM DB2 compatible) & Query-By-Example. Its nice windowing facilities let users easily do ad hoc queries on their dBASE and LOTUS files. $150. dQUERY/lib is a C-callable SQL lib (dQUERY 2.0 included). $295. Add $5 s/h.
QUADBASE Systems, Inc
1567 Keith Drive
Campbell, CA 95008
408-866-0807

DATA ENTRY

Everyone is talking about RODE/PC from DPX

DATA ENTRY

We were using another PC data entry package when we discovered RODE PC. It was so much better that we immediately replaced the other package with RODE PC. – Ikuss Equipment Manufacturer

Six of the ten largest companies in the U.S. have selected RODE PC. Call for your evaluation copy today.

DPX
20825 Stevens Creek Blvd
Suite 140 P
Cupertino, CA 95014
(408) 973-9292
CIRCLE 818 ON READER SERVICE CARD

DATA ENTRY
has changed . . .
From keypunches to 3741s to FourPhase, CADE, and Nixdorf . . . Now even the most complex data entry is quickly moving to PCs. Whether on one PC or on dozens in a LAN, KeyEntry!!! provides a professional-grade data entry system. Its ease of use, productivity and unmatched range of capabilities have made it the most widely used PC-based system in the world.

Isn't it time to bring your data entry up-to-date?

KeyEntry!!!

Complete Evaluation Package
just $42.50, delivered
1-800-533-6879 or (205) 251-2085
CIRCLE 587 ON READER SERVICE CARD

DATA ENTRY EMULATOR
You will not find any PC Data Entry System—FASTER, EASIER to use, or LOADED with more USABLE features. Distribution Worldwide. The EMULATOR will "meet your Data Entry needs-OR-return it with no obligation. PC or DE style keyboard. Fully menu driven. Price $395. 30 DAY FREE TRIAL. Also avail. for IBM S34/36.

COMPUTER KEYES
21929 Makah Road
Woodway, WA 98020
(206) 776-6443

VDE—Viking Data Entry
The premier data entry system. Full-featured to replace key punch & keydisks. Full screen "FORMS," double-key verify, wide variety of options, crossfoots, subtotals, batch balancing, duplicating, statistics, skipping, etc. Character, field & record level validations. $120-600. Also for minis.
VIKING SOFTWARE SERVICES, INC
2815 East Skelly Drive, Suite 816
Tulsa, Oklahoma 74105
(918) 745-6550

VANTAGE DATA ENTRY
DATA SPECIALIZES in Data Entry software/hardware/support & offers the solution to your PC-based data entry needs with VANTAGE software. Runs on standalone or networked PC's. Contains the most ADVANCED features which are not combined in any other PC-based data entry system. Demo Packages available.
Direct Access To Automation (DATA)
303 Beach Road
Burlingame, CA 94010
800-538-DATA or 415-342-6822

DESK TOP PUBLISHING

Optical Character Recognition (OCR)
PC-OCR™ software converts printed/typed documents into editable text files for your desktop publishing system. Supports HP ScanJet, Canon, Panasonic and most other desktop scanners. Pre-trained for many popular fonts and trainable to read virtually any typestyle, incl. foreign fonts. Reads proportional text, matrix printer output and Xerox copies. $385. Check/AMEX/VISA/MC/COD.
Essex Publishing Co.
P.O. Box 391
Cedar Grove, NJ 07009
(201) 783-6940

DESK TOP PUBLISHING

A New Offering of Hand-tuned Bitmap Fonts from VS Software!

FontPaks for HP+ & Compatibles and Canon LBP-8II Laser Printers

EXECUTIVE **HEADLINES**
Each font in point sizes 18, 24, 30
- **Gill Sans Ultra Bold**
- VS Century Bold • *Bold Italic*
- **Antique Olive Bold • Compact**
- VS Times Bold • *Bold Italic*
- **CG Triumvirate Black • Italic**
- **VS BHS Bold • Extra Bold**
- **Rockwell Bold • Extra Bold**
- **ITC Avant Garde Gothic Bold • *Oblique***

45 Bitmap Fonts $179.95

TIMES/TRIUMVIRATE COMBO
Each font has 3 weights—Medium, Italic, Bold. All come in point sizes 6, 8, 10, 12, 14. Bold fonts also in 18, 24, 30.
- VS Times Medium • *Italic* • **Bold**
- CG Triumvirate Medium • *Italic* • **Bold**

36 Bitmap Fonts $169.95

EXECUTIVE **TYPE CLASSICS**
Medium and Italic fonts in point sizes 8, 9, 10, 11, 12, 14, 18. Bold fonts in 10, 12, 14, 18.
- VS Bookman Medium • *Italic* • **Bold**
- CG Omega Medium • *Italic* • **Bold**
- VS Century Medium • *Italic* • **Bold**
- ITC Souvenir Light • *Italic* • **Demi**
- ITC Avant Garde Gothic Book • *Oblique* • **Bold**

84 Bitmap Fonts $279.95

DESIGNER COLLECTION
Tall Man in point sizes 12, 14, 16, 18, 20, 24, 30. Park Avenue in 12, 16, 18, 20, 24, 30. All other fonts in 8, 12, 16, 18, 20, 24, 30.
- **Old English Clustered**
- **Broadway**
- **Broadway Engraved**
- *Park Avenue*
- Tall Man
- *Brush*
- VS BHS Medium • **Bold** • **Extra Bold**

62 Bitmap Fonts $219.95

Both International Extended Characters and US ASCII Formats available.

VS SOFTWARE
P.O. Box 6158 • Little Rock, AR 72216
Write or Call for More Information
501/376-2083
CIRCLE 764 ON READER SERVICE CARD

We don't do newsletters

But if you're doing 1,000-page technical documents, we're the best—automated, style-sheet-driven, sophisticated pagination, slick publishing features, and camera-ready output.

GML/PC™

The technical documentation and specifications specialist.

Command Technology Corporation, 1900 Mountain Blvd., Oakland, CA 94611
Telephone (415)339-3530 Telex:509330 COMMAND TECH
CIRCLE 839 ON READER SERVICE CARD

DESK TOP PUBLISHING

OCR SCANNING SYSTEMS

for PC/XT/AT/PS2 and MAC!

Our "Scanning Connection" products can read text from magazines, books, reports and letters into your PC! We developed a unique trainable character recognition program called "SEE SPOT RUN" for difficult to read typeset material. For typed material, we provide a pretrained program called "READRIGHT." Our "SCORE" program will analyze bubble forms. Selling hundreds of systems each month, we offer customers the lowest prices, best service and technical support. Call us today for the best prices on scanners from HP, CANON and PANASONIC. Dealer and volume discounts available!

1120 KAIBAB • FLAGSTAFF, AZ 86001
(602) 779-3341 • TLX 705609

FLAGSTAFF ENGINEERING

SNA

VPToolbox for Ventura Publisher

File Management – *VPToolbox* instantly displays, prints, copies and deletes selected files or entire chapters or publications.

Chapter Documentation – No more guessing about chapter contents. *VPToolbox* supports user-supplied comments for each chapter. Also shows creation date, last print date, last archive date, and headers/footers.

Style Sheets – View style sheets or print descriptions of every tag for permanent documentation. Cross-reference list shows all chapters using a selected style sheet. Copy and delete tags, compare style sheets, see actual tag usage.

VPToolbox has a quick windowing interface that works with or without a mouse. Available today for $99. To order, contact your Xerox Ventura Publisher dealer, or call (609) 683-1237.

Electronic Page Processing

- L300 hi-res output up to 2540 dpi
- Output to paper or film
- Macintosh or IBM-PC/compatible disks
- 24-hour modem
- Complete Adobe type library
- 24-hour turnaround
- Free pick-up and delivery in I-88 Corridor

Call 312/844-0030

DEE-SIGNER IMAGESETTING
981A Aurora Ave Aurora, IL 60505
24 Hr Computer Bulletin Board 312/844-0093
CIRCLE 583 ON READER SERVICE CARD

Desktop Publishers Int'l.

1-800-548-0386

◆ Ventura Publisher $469

Hundreds of fonts for HP,Postscript	$SAVE
HP SCANJET w/controller	$1499
HP LASERJET II w/ 1.5 MEG.	$2385
Memory upgrades for HPII	$399 & up
Princeton scanner complete	$895
Princeton LM-300 monitors	$1144
Sigma LaserView	starting at $1599
DATACOPY scanner complete	$1899
JLASER + for PC w/2 meg	$799
LaserMaster HP controller	$845
Toshiba 1000 LAPTOP (6 lb.)	$879

Hundreds more desktop publishing products
Ask for our free price list/catalog
Visa & MasterCard welcome
Tech calls & in NY State 1-212-334-1234
CIRCLE 592 ON READER SERVICE CARD

PowerText BookMaker

Print books, booklets, paperbacks, flyers, calendars on your laser printer. Ready to cut and bind, fold and staple, or camera ready for large press runs. Write a 400 page book with only three commands; print a single copy ready to bind for $2.75 at over 20 pages per minute. Print 3 or 4 fold flyers for $.08 a piece. Address them from a database at 400 per hour. Turns your laser printer into a printing press!

Includes the **PowerText Formatter**, *Software for Automatic DeskTop Publishing*, an automatic page layout product which out performs the top of the line WYSIWYG programs. Runs on any IBM compatible. EGA, hard disk and mouse not required. Ready to publish everything for only $395. For 14 page brochure or to order, Call or write:

Beaman Porter, Inc.
417 Halstead Avenue
Harrison, NY 10528
(914) 835-3156
(800) 431-0007

CIRCLE 588 ON READER SERVICE CARD

VENTURA AND PAGEMAKER USERS

COREL HEADLINE creates unique headlines, titles, logos or graphic embellishments for use in Ventura or PageMaker $185 US. With **COREL NEWFONT** you can stretch, rotate, gray, shadow or shade PostScript Plus fonts for use in Ventura. $185 US. **COREL VENTURA UTILITIES** includes Styler, to print your style sheets and 6 other powerful packages. $99 US. **COREL TABIN** lets you easily import a spreadsheet into any desktop publishing or word-processing package $99 US.
COREL SYSTEMS CORPORATION
1600 Carling Ave. Ottawa, ONT K1Z 7M4
(613) 728-8200
CIRCLE 590 ON READER SERVICE CARD

LEARN DESKTOP PUBLISHING
With VIDEOTUTOR. 90 minute video tape, 48 page workbook and example diskette. Learn Ventura Publisher or Aldus pagemaker quickly and easily. Clear comprehensive instruction. Ventura users! Ventura store now open, call for free Ventura utilities and fonts catalog and free Ventura tips card
VIDEOTUTOR/VENTURA STORE
219 Ilihau Street
Kailua, HI 96734
808-254-6419

עברית عربي

DIPLOMAT SOFTWARE SERIES
Use Arabic, Cyrillic, Farsi, Greek, Hebrew, Turkish, Urdu, Vietnamese, etc.. in popular software: WordPerfect, Dbase, WordStar, Spreadsheet, Basic, Prolog, Ventura Publisher, etc..

VN LABS
4320 Campus Dr.,Suite 114
Newport Beach, CA 92660
(714)474-6968
Ελλην Рýсский

CIRCLE 835 ON READER SERVICE CARD

EDUCATION

CROSSWORD POWER™
Multiple versions of puzzles will be automatically created and printed by entering your puzzle words and clues only once. You can combine old word lists into new puzzles too. Up to 80 words in each puzzle. Great for vocabulary review. Full page review Feb. 88 Compute! Check/MO $69 + $2 shipping
WISCO COMPUTING
2821 Sampson Street
Wisconsin Rapids, WI 54494
(715) 423-8189

EDUCATION

*** 1-2-3 SIMPLE AS 1 2 3! ***
SPREADSHEETING 101 simplifies learning all Lotus 1-2-3 features with 256 pg Workbook & diskette. Package also includes handy keyboard template plus 171 pg Reference Book for simple answers to complex questions. SS101 is a complete learning & user package. Only $49.95! 30 day money back guarantee!
SIMPLE SOFT
P.O. BOX 417430, Dept. C
Sacramento, CA 95841
916-338-3857

ENGINEERING

ADVANCED STRUCTURAL DESIGN FAST. FULL. FLAWLESS.
WAS $785.00 NOW $285.00
FOR LIMITED TIME ONLY

ONE COMPLETE LIBRARY OF INTERACTIVE GRAPHIC PROGRAMS TO DESIGN BEAMS, COLUMNS, AND BOTH 2D AND 3D TRUSSES AND FRAMES. NORMAL OUTPUT INCLUDES CODE TYPE STRESS CHECK AND P-Δ EFFECTS IN STATIC AND DYNAMIC ANALYSIS. FOR IBM OR COMPATIBLE.
SEND CHECK OR MO TO:
SMARTCHILO & WHITEHALL LTD.
P.O. BOX 803753
CHICAGO IL 60680-3753
ATTN: CUSTOMER SERVICE
312-334-3231

CIRCLE 765 ON READER SERVICE CARD

ENG/SCI GRAPHICS
OMNIPLOT(S) (screen graphics) & OMNIPLOT (P) (plotter driver) provide integrated engineering/scientific 2-D & 3-D graphics with NO PROGRAMMING REQUIRED! Menu-driven, flexible, professional. Choice of formats: tabular/line, contour, bar, pie, 3-D wire frame & much more! OMNIPLOT(S) $195, OMNIPLOT(P), both $295.
MICROCOMPATIBLES
301 Prelude Drive
Silver Spring, MD 20901
(301) 593-0683

GRAPHIC TRIANGLE SOLUTION
No knowledge of trigonometry required. Enter any side or angle in any order. Solves as soon as it has enough data. Prompts with upper and lower limits of any entry. Flips, rotates, prints, saves, recalls, draws scale views, displays vertex coordinates, inscribed circle, etc. PC/Comp's, color or graphics $25.00
RITE ITEM
1622 North Xerxes Ave.
Minneapolis, MN 55411
(612) 588-6483

Engineering
continues . . .

ENGINEERING

ARCHITECTS AND ENGINEERS

The AEMAS system is designed for Architects, Engineers & other firms where monitoring project costs is required. Modules include: Job Cost, Payroll, A/P, A/R, Invoicing, Personnel Scheduling, Report Generator and General Ledger. Multi-terminals are available.
DATA-BASICS
11000 Cedar Road, Suite 110
Cleveland, OH 44106
(216) 721-3400

STRUCTURAL DESIGN

Fast, highly interactive, integrated programs for structural analysis and design of BEAMS, COLUMNS, TRUSSES and FRAMES of any material. Easily mastered programs result in dramatic time savings while producing efficient, accurate designs. Specify PC, XT or AT and send $25 for demonstration diskette to:
C-Squared B-Squared Software Design, Inc.
461 Bush Street Ste 220 Dept. A-2
San Francisco, CA 94108
415/391-7309

SIMULATION

GPSS/PC is a full-power version of GPSS, the most popular mainframe simulation language. Specifically designed for interactive use on today's high-speed microprocessors, it is loaded with features such as interactive graphics and animation. Using GPSS/PC, you can predict the behavior of complicated real world systems.
MINUTEMAN SOFTWARE
P.O. Box 171/B
Stow, MA 01775
800-223-1430/617-897-5662 Ext.316

TRACK YOUR BOTTOM LINE!

Job-Cost/Job-Bill is written especially for Architectural and Engineering firms where project cost management and invoicing is required. Menu driven features: Job History, Expense Summary, Time/Wage/Salary/Billing Totals, Password Entry, and Invoicing. IBM & compatibles, 256K/Hard Disk reqd., Demo Available.
SAI/Structural Analysis, Inc.
301 W. Camino Gardens Blvd., Suite 110
Boca Raton, FL 33432
Toll free 800/635-6366 Tone 814

ENTERTAINMENT/GAMES

TRAIN DISPATCHER

TRAIN DISPATCHER is a realistic simulation of a railroad traffic control center. It was created by designers of CTC systems for operating railroads and is used by some railroads in their dispatcher training programs. Available for IBM PC, XT, AT and Jr. for $35 + $2.50 s/h. Color Graphics card required. MC/Visa accept.
SIGNAL COMPUTER CONSULTANTS, LTD.
P.O. Box 18222, Dept. 33
Pittsburgh, PA 15236
(412) 655-7727

ENTERTAINMENT/GAMES

GOLFERS! Can your personal computer help you be a better golfer? Can it help you enjoy the game more? It can if you have the . . .

GOLF ANALYZER™

The most sophisticated golf game analysis software available. **NOT A GAME.** It gives you 9 pages of useful, easy to understand information about your play. Designed to help you be a better golfer. See *Golf Digest*, April 1987. On 5¼" disk for all 256K or larger IBM Standard Computers.

Send a **$39.95** Check or Money Order to:
GOLF ANALYZER
Box 9J, 315 East 69th Street
New York, N.Y. 10021
CIRCLE 706 ON READER SERVICE CARD

NEMESIS...

"If you are interested in Go, buy this program." Jerry Pournelle, Byte 7/87
Why do the Japanese show Go on prime time TV? Learn why they have been addicted to this game for millenia. NEMESIS™, the world's strongest Go program, is the ideal tutor. Packed with vital teaching features, NEMESIS™ even tells why he makes his moves!
To order call 617-890-4184 or send $79 for Nemesis or $125 for Nemesis plus optional 1000+ Joseki Tutor + $3 S/H.

The Go Master™
Toyogo Inc.
CIRCLE 595 ON READER SERVICE CARD
100 5th Avenue, Dept. M, Waltham, MA 02154

LOTTERY TRACKER AND WHEELER™
For ALL PICK-SIX games where you choose from up to 70 numbers! Stores past 1000 winning drawings and dates. Stored numbers are analyzed 4 ways - HOT, DUE numbers and RECENCY displayed on screen or printed charts. Select 5 betting methods and choose one of 20 built-in popular WHEELING SYSTEMS! Check bets for all winning combinations. Prints charts, statistics, numbers and wheeling systems. Why pay up to $99 for less? NEW!! IBM/Comp. $34.95 + $1.50 S&H.

THE DAILY NUMBER BUSTER! ™
They said it couldn't be done! A complete software package for 3 and 4 digit daily numbers games. All of the LOTTERY TRACKER AND WHEELER features including ALL straight and box bet combinations. Prints charts, statistics, numbers and systems. NEW!! IBM/Comp. You'll love this software! $34.95 + $1.50 S&H.

ENTERTAINMENT-ON-LINE, Inc.
P.O. Box 553 Dept. PCM
Westboro, MA 01581
VISA & MC call: 1-800-624-7088 Ext. 283
CIRCLE 597 ON READER SERVICE CARD

LOTTO NUMBER ANALYZER

Use your PC to help you win the Lotto. Forget random numbers! This fun to use program for most home computers will quickly tell you which numbers are 'due', patterns and trends, what groups to play and more! Make you selection based on the laws of probability and INCREASE your chances of winning!
IBM and others only $24.95
plus $2.00 Ship /Handling
Fast service on V/MC & MO

SOFT-BYTE
(513) 278-1110
P.O. Box 198, Forest Park
Dayton, OH 45405
CIRCLE 773 ON READER SERVICE CARD

Adult Software

For IBM PC, XT, AT, PS/2 & Compatibles
GRAPHICS CARD NEEDED

Volume I	$11.95 ppd
Volume II	$11.95 ppd
Volume III	$16.95 ppd
New Series	
M1 thru M7	$5.00 each ppd
Catalog Diskette	$4.00 ppd

World's Largest Distributor
Check, Money Order
Bank Check Accepted

AOS
P.O. Box 106
Marion, CT 06444
Must State Age is Over 21
CIRCLE 755 ON READER SERVICE CARD

RUN COLOR GAMES on your mono monitor

Works with any monographics card. Runs most all CGA programs, even self-booting ones. The best performance for your mono XT or AT system-works great! Realistic and very usable-even for fast moving games. These Work: BASICA, Flight Simulator, GRASP, PACMAN, ZAXXON, LODERUNNER, PrintShop, etc.

$29.95 DO-COLOR

1-800-854-0561 ext 854 (orders)
$3.00 shipping CA res add $1.80 MC/VISA
Wilkinson Software
6400 Westminster #115, Westminster, CA 92683
(714)894-3216
CIRCLE 757 ON READER SERVICE CARD

FOOTBALL WAGER $$$ WARE

Don't buy a football handicapper till you call or write Rotten Robbie for free information. Programs have 1988 schedule including pre-season. Built in data base that allows an analysis the first week. Plus a wager summary to track your hypothetical bets. Free BBS Support. Pro-Trueline or Major College $49.95
J&R Software
523 Second Street
Towanda, PA 18848
717-265-4258 Info/800-634-2438 Orders

PRO FOOTBALL HANDICAPPER

Get the winners edge! PC-PICKS is the best NFL software you can buy, regardless of cost. It picks point spreads using adjustable formulas, and lets you view or print stats in 62 categories. Enter stats from boxscores, or get them FREE by modem from our BBS! $34.95 ($6.95 for demo) MC/Visa/chk/mo/po.
MICROBROTHERS
P.O. Box 339
Lafayette, CO 80026-0339
Order anytime at 1-800-628-2828 ext. 865

SPORTS HANDICAPPING SOFTWARE

$$WIN with thoroughbred/harness & greyhound handicapping software-$52.95 each. Up to 13 entries analyzed: class, speed, times, odds, track, post, stretch, & finish. Pro Football, Baseball, Basketball Software—$52.95. Handicap races & games in minutes. MC/VISA accepted. Free info.
SOFTWARE EXCHANGE
P.O. Box 5382-PC
W. Bloomfield, MI 48033
(313) 626-7208. Orders: 1-800-527-9467

LOTTO POOL AND ANALYSIS

Lottery Pool Administration System. Keeps track of participations, calculates amounts won, % of pools full & keeps history. Lotto Analysis and wheeling system complete lotto analysis. Too much to list. Has exclusive wheeling system & checks tickets for winners. $39.95 each. Demo $5.95 + $1.50 s&h
TRANS ATLANTIC CORPORATION
828 W. Lill Street
Chicago, IL 60614
DEALER INQUIRY FAX (312) 829-6046

FINANCIAL

Charting Software

PC MAGAZINE Editor's Choice

MetaStock™

$195
Demo Disk—$5

Perform sophisticated technical analysis on stocks, mutual funds, commodities, etc. Features multiple movable windows, unlimited moving averages, 25+ pre-set indicators, trendlines and trading bands, overlays and spreads, plus much more! Compatible with 12+ major data services. For complete literature, call toll-free:

1-800-882-3040

EQUIS International, Inc.
Box 26743 S.L.C., UT 84126 (801) 974-5115
CIRCLE 830 ON READER SERVICE CARD

FINANCIAL

E•Z•CHECK PLUS

Most powerful business & personal bank account manager.

Handles all types of transactions, over any time period. Provides **instant** access to all transactions (up to four billion records). You will not outgrow this program!

Up to 63 user-defined accounting codes for quick, accurate cash-flow analysis and general accounting. Makes tax preparation a breeze!

Automatically addresses and prints checks. Pay bills in seconds!

Check your bank statement in minutes with special quick-reconcile feature.

Prints easy-to-understand statements and checks in two different styles.

Friendly design and extensive pop-up help screens make E•Z•Check Plus a joy to use! Comes with complete documentation and free unlimited technical support.

800-258-5749
Mon-Sat : 10:00 AM - 9:00 PM
Call now for same-day shipping (Visa/MC)
64.95 + 5.00 shipping and handling (SC residents add 5%)
Requires hard disk & 256K RAM
Not copy protected

CIRCLE ON READER SERVICE CARD

CDI Microcomputer Systems • 2205 Decker Blvd. • Columbia, SC 29206

CIRCLE 820 ON READER SERVICE CARD

ACCU CALC COMPOUND INTEREST POWER TOOL AND MORE

Partial list of features:
• 30 functions in all • Easy to use • 5 types of amortization schedules • IRR's and NPV's • Compound yearly, quarterly, monthly, etc. • SL, DB, and SYD depreciation schedules • Regression and correlation • Creates print-outs, dBASE files, ASCII files.

$88

NATIONAL
(800) 262-6890
FLORIDA
(800) 330-6722

PCWORKS, INC. P.O. Box 652922 Miami, FL 33265-9947 • (305) 553-2199

CIRCLE 599 ON READER SERVICE CARD

NEW HFS - III

Home Finance System

Saves time
Saves money
Simplifies taxes

- Designed especially for home use.
- Menu driven.
- Simple checkbook-style format.
- Manages checking, charge accounts, IRAs and more.
- Prints expense, deposit and total financial summaries, or selected transactions.
- Prints checks on your format, with payee address.
- Pop-up menus and help windows.
- Macro keys and model transactions for speed and convenience.
- Fast assembly language.
- Not copy protected.

Now only $99.00, includes shipping. In Iowa, add 4% sales tax. VISA, MasterCard accepted.

Jay Gold Software, Inc.
P.O. Box 2024
Des Moines, IA 50310
(515) 279-9821

CIRCLE 600 ON READER SERVICE CARD

MONEYCOUNTS® Is Only $16!

Easy-to-use CPA-designed money management accounting system for home and business. Checking, credit card management, smart checkbook balancer, budgeting, financial statements, graphics, financial data base with three-way look up, inquiry reports, on-line help, pop-up calculator, tutorial, lots of capacity (up to 999 accounts/24000 entries per year) and much more. **Not copy protected.**

New Version 4.0
Now includes:
- **Financial calculator** computes interest rates, loan and balloon payments, prints loan amortization schedules
- **Automatic entries**
- **Journal entries**

And More!

Call or send $16 + $3 shipping handling
Check VISA MC
1-800-223-6925
In Iowa 319 373-0224

Dept. M
6925 Surrey Drive NE
Cedar Rapids, Iowa 52402

CIRCLE 598 ON READER SERVICE CARD

PFROI!™ $20 Super Portfolio Manager

- Stocks/Bonds/M. Funds/Dpr. Assets
- Bef. & Aft. Tax ROI (IRR method)
- Div. & C.G. Reinvestment/Tax Lots
- 10+ rpts, CGA & Hercules graphics

Or also with CAPTOOL™ $79...
- DJ, Compuserve & GEnie pricing
- Multiple portfolio batch ops
- Bond swap YTM & stock valuators
- Client stmts, s-rel'g & screens

IBM PCs/PS-2 $3 S&H Chk/VISA/MC
45-day money-back guarantee

TECHSERVE, inc. (206) 747-5598
POB 70056, Bellevue, WA 98007

CALL 1-800-826-8082
CIRCLE 774 ON READER SERVICE CARD

SPECTACULAR STOCK PLOTS!

SPLOT! plots up to 100 user selectable stocks, portfolios, comparisons, ZOOM 1 yr-2 wks; uses stock price files from Dow Jones. X*Change, X*Press or integrated editor. Not copy protected. Requires EGA, 256K, hard disk, DOS 3+. $90 check, money order. 30 day refund.
DATA BASE ASSOCIATES, Dept. P
810 Richards Street, Suite 901
Honolulu, HI 96813
(808) 521-6459

TAX TIME A DRAG?

Start now for next April. Collect/organize tax data as you pay bills. Get one-time entry for:
*Tax Data / Date Sensitive Notes
*Check Registers / Bank Reconciliation
*Check Printing / Recurring Payments
THE TAX COLLECTOR - $68.95
VERIFIED SOFTWARE PRODUCTS
4573 Dogwood Avenue
Seal Beach, CA 90740
(213) 594-4202

LOAN AMORTIZER +

Excamort: Loan Amort's simple/complex, extra pymts, points/fees, APRs (Per Reg.Z), balloons, solve unknowns, yields/IRR, PV, FV, store/retrieve, more. IBM PC/XT/AT/PS2/compat. Great for client services. Acclaimed nationwide by Banks/Legal/CPAs/CUs/S&Ls/R.E. $149.95 + $5 s/h. Visa/MC/AmEx. 60 Day MBG.
ELECTROSONICS
36380 Garfield #1
Fraser, MI 48026
800/858-8448, 313/791-0770

PC Magazine Classified Marketplace
the ultimate target market!

The brand specifiers who read PC Magazine don't have the time to shop around; their only concern is getting what they need as quickly as possible.

They'll DIRECT their attention to PC Magazine Classified Marketplace

For them PC Magazine Classified Marketplace's Direct Response Display Ad format represents a fast, easy and cost effective method of product acquisition. They know it will have the products they need and the information they want regarding price, volume discounts, specifications and delivery.

If you think that your business can benefit from the 568,000 brand specifiers who read PC Magazine YOU'RE RIGHT!

So take DIRECT action and call (212) 503-5115

FLOW CHARTING

Flow Charting II+

The New Plus for Fast Flowcharting

FLOW CHARTING is new! It's now Flow Charting II+, with more speed + more functions + more printing options;
- **10 text fonts; 26 shapes;**
- **Line mode can stop at a shape;**
- **Backspace key can erase a line to its origin;**
- **Free text entry anywhere, or select auto-centering;**
- **Vertical or horizontal printing; one chart or multiple charts.**

Used by Fairchild, Bechtel and more than 500 other major corporations. Edit quickly and accurately — even major edits — with Flow Charting II+, the Specialist.

See your retail store or call:

PATTON & PATTON
Software Corporation
1-800-525-0082, Outside California
408-629-5376, California/Int'l.

CIRCLE 751 ON READER SERVICE CARD

MARKETPLACE

FLOW CHARTING

BETTER FLOWCHARTER
Know before you buy! EASYFLOW is the superb flowcharting program chosen by over 30,000 users, and very favorably reviewed in the March 10th 1987 issue of PC Magazine. See the "Index to Advertisers" under HAVENTREE to find our large display ad in this issue. Now available with 30-day MONEY-BACK guarantee
HavenTree Software Limited
Order Desk: 1-800-267-0668
Information: (613) 544-6035
Telefax: (613) 544-9632

GENERAL

14 FOR $136!
SoftPourri is a set of 14 useful programs:
- Planning calendar
- Graphs without graphics
- Spelling checker
- Accounting reports
- Configure printer, keyboard, anything

And more! Only $136. FREE Brochure.
Craig Banning
Route 3, Box 317
Big Pine Key, Florida 33043
(305) 872-3817

GRAPHICS

DYNAMIC 3-D GRAPHICS
Using the fastest video driver routines ever written for the IBM PC, ACRDSPIN allows you to dynamically rotate, translate, and scale 3-D wire frame objects and point clouds. Works with most CAD Packages. Supports CGA/EGA/MCGA/VGA/HERCULES on IBM pcjr through PS/2. $30 + $2s/h (+ sales tax for CA res).
ACROBITS
P.O. Box 1302
Menlo Park, CA 94026-1302
415-328-0542

GRAPHICS LIBRARIES
Very Fast 2-D & 3-D Autoscaling Graphics for Fortran & Pascal. 3-D Lines. Use Color for Z-Axis. Fast Polygon Fill with Cutouts, Solid/Wireframe. Many Fonts, Color/Blinking Text. X-Y, Bar, Contour & Fishnet Graphs. Drivers for Dot Matrix/Laser Printers, Pen Plotters, CGA, EGA & VGA. I/O Port Control. $140
CHIRP TECHNICAL SERVICES
P.O. Box 551
Del Mar, CA 92014-0551
(619) 259-6886

TO PLACE YOUR AD IN PC Magazine Classified Marketplace
Call (212) 503-5115

GRAPHICS

GRAFPLUS™

Power Pack Your PrtSC Key! Only $49.95

Grafplus™ turns any IBM or compatible graphics application into a powerful communicator by printing exactly what you have created on your computer screen.

- Print in color, black-on-white, white-on-black
- Scale the image to any size
- Print vertically or horizontally
- Work with virtually any bit-mapped dot matrix, laser, or inkjet printer
- Link into Pagemaker or Ventura

Jewell Technologies
4740 44th Ave. S.W.
Suite 203
Seattle, WA 98116
206-937-1081

CIRCLE 752 ON READER SERVICE CARD

FORTRAN/PASCAL GRAPHICS
GRAFMATIC (screen) Microsoft Fortran/Pascal, R-M, Lahey callable routines. Graphics primitives, total 2-D plot support, 3-D plots and solid models. EGA/CGA Hercules mono. support. HP/HI plotter? PLOTMATIC. Laser, dot matrix printer? PRINTMATIC. $135 ea. Any 2, $240, all 3, $340. Ask about our 15 fonts.
MICROCOMPATIBLES, INC.
301 Prelude Drive Dept. PC
Silver Spring, MD 20901
(301) 593-0683

FAST GRAPHICS IN BASIC
BOOSTERGRAPHICS v.1.1, Create Graphics Effects & Graphics-Based user interfaces using CGA,EGA,VGA, or Hercules adapters. Graphics primitives, page swapping, enlarging, fast windows, menus and much more. For QuickBASIC, BASCOM, Turbo BASIC. In Assembly. $65.00 + $3.00 s/h. Also for C.
Suncloud Software
555 South Camino Del Rio
Durango, CO 81301
(303) 247-0439

35mm SLIDE FROM YOUR PC
COMPUTER SLIDE EXPRESS converts graphic files produced on the IBM PC into brilliant 35mm color slides with color resolution 400% better than your monitor. Leave your printouts behind. Use high resolution color slides up to 4000 line. COMPUTER SLIDE EXPRESS $9/slide.
VISUAL HORIZONS
180 Metro Park
Rochester, NY 14623
(716) 424-5300

BAR, LINE & PIE CHARTS
with GRAPHX. From simple to complex, including 3-D effects. And you can add your own labels and notation to graphs. Easy to use. Great for presentations. User manual. Supports EGA, too. $49.95 + $3 S&H. Brochure available. VISA or MC. Call 24 hrs/day, 7 days/wk.
WRIGHT SOFTWARE
4006 Tall Oaks Drive
Blacksburg, VA 24060
703-951-3314

HEALTH

ANALYZE DIETS, MENUS & . . .
so much more! with The FOOD PROCESSOR II! This TDP-rated software has the best database of any system on the market today! Acclaimed by schools-colleges-hospitals-homes-fitness centers & businesses. 2400-3000 foods-30 nutrients. $250. IBM-Apple-Macintosh.
CALL OR WRITE TODAY FOR FREE DEMO DISK!
ESHA Research
P.O. BOX 13028
SALEM, OR 97309
(503) 585-6242/7755

DIETWISE/ENERGYWISE
For Diet, Nutrition, Fitness conscious people
- DIET Evaluation (children and adults)
- MENU Analysis
- RECIPE
- BODY COMPOSITION
- ENERGY EXPENDITURE
- MS/DOS $39-$120 (professional vers. avail.)

NUTRITIONAL DATA RESOURCES
P.O. Box 54D
Willoughby, Ohio 44094
800-NOR-DIET . . . . Ohio (216) 951-6593

PC-RELAX™
Finally A Program That Calms You Down: Shapes, Colors, forms, continually changing images, non-repeating, abstract & realistic. Self-driven or interactive, relaxes and/or stimulates according to mood, eases tired nerves. "Monitoritis" in office/home. Reviewed by doctors. Needs EGA/CGA/MonoGraphics. $39.95 + $3.00 S&H (+ N.Y. Tax) VISA/MC.
TRUE IMAGE
P.O. Box 660 - Cooper Station
New York, N.Y. 10276
(212) 777-7609

INVENTORY

*****dFELLER INVENTORY*****
A business inventory program written in modifiable dBASE source code. The menu-driven program lets you locate items by inventory name or number. It keeps track of reorder points, vendors, average cost & other information.
* dFELLER Inventory $150/Requires dBASE II/III
* dFELLER Plus $200/with History & PO's. Requires dBASE III-III PLUS (for stock rooms)
FELLER ASSOCIATES
550 CR PPA, ROUTE 3
Ishpeming, MI 49849
*** (906) 486-6024 ***

MANUFACTURING INVENTORY $99
Inventory control with Bill-of-Material Processing and vendor file for small to medium size batch manufacturers or job shops. Project material requirements, allocate material, maintain material cost per work order and for all WIP. Allows up to 3 remote terminals to receive or issue material. Meets supplier log requirements of MIL-I-45208.
REAL TIME AUTOMATED, INC
1340 B No. Dynamics St.
Anaheim, CA 92806
714-993-0111

INVENTORY MANAGEMENT
Stock-Master 4.0, commercial grade system provides Stock Status, Purchase Order Writing & Tracking, Trend Analysis, Quality Control Reporting Detail Analysis, Bill of Materials, Multi Locations and more. Modular, "micro" priced & configured to your needs. Cobol Source available.
APPLIED MICRO BUSINESS SYSTEMS
177-F Riverside Ave.
Newport Beach, CA 92663
(714) 759-0582

LANGUAGES

SSS Fortran
Reduced from $325
Small Systems Services
Extended ANSI-66 Fortran Compiler..... *Now* $95
RATFOR (source code) (was $100).....*Now* $35

Multi Data Management, Inc.
PO Box 3333 Urbana, IL 61801
Inquiries: (217) 367-0903
Orders (Visa/MC):
(800) 255-2255 x3300
CIRCLE 594 ON READER SERVICE CARD

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

MAILING PROGRAMS

MAILING LIST FORMATS: By Name, By Company, By City, By Zip Code, By Search Codes

MAIL MERGE: Word Star, Word Perfect, MS Word, Multimate, Standard ASCII

FREIGHT BILLS: Bulk or Individual Printouts — Federal Express, Airborne, UPS, DHL, Purolator

THE MAIL MONSTER

Takes The Bite Out Of Mailing List Requirements For Any Size Company

LABELS: Continuous Form and Laser Labels 3½" × 15/16" — 1 across; 4" × 1 7/16" — 1 across; 4" × 15/16" — 2 across; 2½" × 15/16" — 3 across
Name Badges: 3½" × 2 7/16"
Shipping Labels: 4" × 2 15/16"
Index Cards: 3" × 5"
Post Cards: 3½" × 6"
Rotary Index Cards: 2 1/16" × 4"; 3" × 5"

FEATURES: Written in DBase III • Compiled in Clipper • Source Code Included • Totally Menu Driven • Integrated • Excellent Manual • File Import/Export

BRITTAIN SYSTEMS, INC.
3457 Normandy #3 • Dallas, TX 75205

Price ***$100***[00] + Sales Tax ***(214) 528-3020***
VISA, AMEX, MC, Accepted

CIRCLE 823 ON READER SERVICE CARD

PC/LABEL MASTER
Editors' Choice 1987
A mailing list program that does everything except walk to your post office box.
o Maintains unlimited records
o Allows up to 30 user codes
o Index/last name & zip codes
o Sorts on any field
o Imports and exports files
o Checks duplicates
o Auto dialer; plus much more
$49*15-day money back guart.
BEST PROGRAMS
2700 S. Quincy Street, Arlington, VA
800/368-2405;(703) 820-9300
CIRCLE 799 ON READER SERVICE CARD

ZIP DIRECTORY ON DISK
• 90,000 zip codes with city, state, county. Speed data entry. Compatible with most database software. On disk or tape
• CLEAN-A-LIST—Program that finds and fixes address errors in mailing lists
• ASSIGN-A-ZIP—Street data files for 5-digit zip assignment
1-800-431-2577
DCC DATA SERVICE, INC.
1200 18th St. N.W. Ste. 704
Wash., D.C. 20036 • 202-452-1419
CIRCLE 776 ON READER SERVICE CARD

"THE MAIL ORDER WIZARD
is one very powerful program. It offers a catalog business all the computing routines it needs- and then some! gives new meaning to the hackneyed phrase, 'user friendly' ... Written in Assembler, it operates with lightning speed very serious software, a 'must see' "
Catalog Age $970, Demo, $12.
The Haven Corporation
802 Madison Dept. M
Evanston, IL 60202
800-782-8278

THE TURBO MAIL ORDER MANAGER
The user-friendly answer to mail/phone sales. Handles all charge card types and cash sales. Includes sorting for printing credit card slips, mailing labels, shipping labels, sales tax reports, invoices, sales summary, and, customer base summaries. Custom service available. Only $190 + $3 s/h, Visa/MC/AMEX
MTN, Inc.
1422 Pine Hill Drive
Garland, TX 75043
214-840-9313

POSTWARE MAILING SYSTEM
Automate mail preparation. Cut postage costs by 5¢ per piece or more. Only PostWare prints address labels in bundle and bag, bulk mailing order. Not a useless zip code sort. Prints address labels, bag tags/tray labels. Calc postage. Works with dBase III PLUS, DATAEASE, PowerBase, Smart & others. Also ASCII
• 1st & 3rd Class—$195 • 2nd class—$395
• Carrier Route—$300 • Dup. Detector—$200
PostalSoft, Inc.
515 Division Street
La Crosse, WI 54601-4544
608/784-3500 800/831-MAIL (6245)

DOCTOR DATA LABEL V1.2
Complete & easy-to-use menu-driven mailing list manager. dBASE III compatible files. Bulk & CAR-RT SORT. Index, filter, sort, & print in any order. Mail merge, duplicate checker, & much more. Two versions available: Unlimited records per file for $79 + $3 S/H ($82) or 250 records per file for $3. Call or write for more information
DOCTOR DATA SOFTWARE
P.O. Box 11368
Phoenix, AZ 85061-1368
(602) 246-8907

THE MAIL ORDER ACCOUNTANT
Order fulfillment/List management. Includes customer lists, labels in 6 formats, inventory, invoicing, accounts receivable, customer payments by cash/credit card. Prints shipping labels, credit card slips, UPS shipping manifests, sales tax report. dBase III Plus source code provided. $975, demo $25 + $3.50 S/H
GOLDSMITH & ASSOCIATES
48 Shattuck Square, Suite 86
Berkeley, CA 94704
(415)540-8396

TO PLACE YOUR AD IN PC Magazine Classified Marketplace Call (212) 503-5115

MANUFACTURING

MINIMIZE PRODUCTION COSTS
Enter your company's operational costs, current status, and sales forecast for up to 156 time periods. PMODEL finds production rates, inventory and employment levels for each period such that production scheduling costs are minimized. $200 VISA/MC. Also Linear Transportation, & Upper Bound Programming.
Best Way Software
P.O. Box 9656
Warwick, RI 02889
(401) 738-0881

MANUFACTURING

MACHINE SHOP SOFTWARE
Incorporates 6 options for estimating or for improving productivity on the plant floor:
• specify-turning/milling feeds, speeds, horse power
• specify - drilling & reaming feeds, speeds
• analyze - cutting tool problems
• calculate - X/Y coordinates from any ref.
• calculate - volumes/weights of metal shapes
INCREDIBLY SIMPLE/EXTREMELY POWERFUL (FOR IBM PC/AT/XT OR COMPATIBLES)
US $299.00 CHK/VISA/MC
COMPUSTEP PRODUCTS CORPORATION
1870 Bonhill Road
Mississauga, Ontario Canada L5T 1C4
(416) 678-1713

THE FOREMAN
Multi-user Now Available!
• Inventory/BOM/PO/Costing
• MRP/Invoicing/Ad hoc reports
• Repetitive mfg or one time build
• Extensive Cost Control: Standard vs. Actual
• Automotive release interface
• IBM PC/NOVELL/ALTOS
DCM COMPUTER PRODUCTS, INC.
43700 Twelve Mile Road
Novi, MI 48050
(313) 347-9600

MEDICAL

XL1™ A Complete Solution
XL1™ is a full featured Practice automation system. Some of its many features:
•Insurance claims - electronic & paper
•Complete patient data & recall info
•Billing - patient, account, point of service
•Full financial reports - daily, monthly, annually
•Supports 15 physicians
•References provided
•Support lines open 9AM to 9PM EST Mon-Sat
•90 day full refund if not completely satisfied
•Full featured demo - $75 credit towards purchase
•$1450 includes 1st year of support/enhancements
Practice Management Systems, Inc.
9450 Two Notch Road
Columbia, SC 29223
1-(800)-521-7217
CIRCLE 831 ON READER SERVICE CARD

MEDICAL

MDX-PC

MDX-PC brings you the best of both worlds: the power and flexibility of MDX medical-office software in a PC-DOS format. Flexes for any specialty; manages billing, electronic claims, custom reports, medical records, more. Full upgrade path to MDX with UNIX/Xenix. Call for info and free videotape.

CALYX CORPORATION
150 N. Sunnyslope Rd., Brookfield, WI 53005
(800) 558-2208 or (414) 782-0300
CIRCLE 756 ON READER SERVICE CARD

MEDICAL SYSTEMS WITH ECS
All PPM products have electronic claims submission (ECS) to Medicare & commercial carriers, paper claims too.
- PC ★ CLAIM $89.95, claims only.
- PC ★ CLAIM w/ICO's, CPT's & HCPC codes $229.95.
- PC ★ CLAIM PLUS claims only w/patient file. Complete a claim in one minute $459.
- THRESHOLD ★ TM $1,995.00 claims, A/R patient billing.
- THRESHOLD $3,995.00 claims A/R patient billing, complete practice management, statistics, analysis.
- CLAIM ★ NET Nationwide claims clearing house. Full 100% credit on product upgrade. PC ★ CLAIM & PC ★ CLAIM PLUS both house 30 day money-back guarantees. IBM PC/XT/AT compatibles MS-DOS 256K.

PHYSICIANS PRACTICE MANAGEMENT
1810 South Lynhurst Suite Q
Indianapolis, IN 46241
(317) 634-8080
In continental U.S. call (800) 428-3515
Indiana residents call (800) 792-3525

Medical/Dental Systems
Second Decade. Support for more than 130 machines. Featuring paper and electronic claims, patient billing, appointments, diagnostic data base, word processing, financial histories, payroll, accounts payable, and general ledger. Single and multi-user systems. Starting at $199.95. 2,400 Dealers.
CMA Micro Computer
55888 Yucca Trail #6
Yucca Valley, CA 92284
619/365-9718

COMPUMEDIC™
PROVEN Practice Management System—in use 7 yrs. Electronic claims, A/R, G/L, statements, insurance forms, practice analysis, word processing, recall, delinquent tracking, historical data. FLEXIBLE! user designed forms/reports $4400. Training avail. Dental (DentalWare™), eyecare/optometry (EyeMate™) & Vet. (VetLogic™) also avail. Dealer inquiries invited.
DATA STRATEGIES, INC.
17150 Via Del Campo Suite 203
San Diego, CA 92127
(619) 451-0480

DRs/ASSISTANT HAS IT ALL!
Profit with the most complete software for PCs. Superbills, A/R, insur forms, Problem Oriented Medical Records, productivity, scheduling, recall, MORE. MD written, proven over 7 yrs. Only $989. Larger capacity, faster DRs/MANAGEMENT $1495. Networking $1995. FREE DEMO. CAN YOU AFFORD NOT TO TRY IT? MC/VISA
MEDSOFT OF CALIFORNIA, INC.
13588 Samantha Avenue
San Diego, California 92129
Toll free (800) 541-0900

MUSIC

MIDI
Interface CMS-401
Sequencer 256 Track
Keyboards/Guitars

CMS
COMPUTER MUSIC SUPPLY
714/594-5051
382 N. Lemon Ave
Walnut, CA 91789

MIDI

MIDI Starter System Plus™
PC *standard* MIDI Co-Processor
MelodEase Piano Roll Composer
Easy-8 Multi track Recorder
Synth Sound Manager Software
$219 *with MIDI cables*
ask about our MIDI Programmer's ToolKit

Music Quest, Inc.
1700 Alma Dr. Suite 260
Plano, TX 75075 **(214) 881-7408**
CIRCLE 777 ON READER SERVICE CARD

MUSIC

COMPUTER MUSIC PRODUCTS
for the IBM PC/XT/AT and Compatibles

VOYETRA TECHNOLOGIES
333 FIFTH AVE, Dept C,
PELHAM, NY 10803
(914) 738-4500
CIRCLE 758 ON READER SERVICE CARD

COMPUTER MUSIC CATALOGUE!
Largest music software selection anywhere! 80 pages of detailed information on the leading computer music products including waveform editors, transcribers, sequencers, MIDI interfaces & more. Get the facts! Competitive prices! Visa/MC. Worldwide shipment! Send $3 for 2/yr catalogue subscription.
DIGITAL ARTS & TECHNOLOGIES
Dept. PC1, P.O. Box 11
Milford, CT 06460
(203) 874-9080

FORTE I/II MIDI Sequencers
16/32 tracks, 16 channels/track Record/Playback. 60,000 notes. Most powerful MIDI editing. Rhythmically flexible Step entry. Auto Punch, quantization, realtime playback control, DOS shell. New in FORTE II: System exclusive storage, unlimited looping, SMPTE cue list, Songlist, Accel/ritard. $150/$250
LTA Productions
P.O. Box 6623
Hamden, CT 06517
(203) 787-9857

UNLEASH YOUR MUSICAL GENIUS
••••• COMPUTER MUSIC SYSTEMS! •••••
*MUSIC SOFTWARE all computers for: music printing, composing, home recording
*MIDI SYNTHESIZERS ETC!
*SEMINARS & EDUCATION
For a free catalog or info call write visit
MUSICATION
1800 Broadway Suite 1000A (W. 48th Street)
New York, N.Y. 10019
212-957-9100

PC Music Co. (800) 634-7249
Don't get stuck with a toy! PC Music offers a wide range of name brand music hw and sw to turn your PC into an awesome recording studio. Let an expert match your needs with the right equipment at LOW prices. Novice or Pro: Create! Publish! Perform! Call day or night.
PC Music Company
P.O. Box 34315
Bethesda, MD 20817
(800) 634-7249

MusicEase 2.0
Full featured music processor: print, play, transpose, cut & paste, no range limitation, 1-2-3/WordStar style commands, multiple voices/staves, lyrics, all keys/meters, custom symbols/placement, WYSIWYG, beams & more. IBM/Epson printer, CGA graphics monitor. Intro offer. Send $99.95 + $5 s/h.
Grandmaster, Inc.
P.O. Box 2567
Spokane, WA 99220
(509) 747-6773

MIDI Card and Software
PC MIDI Interface Card, Sequencer Software and 4 MIDI cables (1 in, 3 out) ONLY $149.95! 64 tracks. 60,000 events, 600 ticks/qtr note resolution! Fast, full featured, easy to use software. Best MIDI offer ever made! Developer's source code $19.95. Dealer inquiries welcome.
MIDI MUSIC
500 East Arapaho, Suite 609
Richardson, TX 75081
(214) 238-5269 (800) 456-MIDI

SONGWRIGHT IV
Music Processor prints professional sheet music, songs, scores with text, chords, symbols. Compose, edit, copy, record, transcribe, play, transpose to any key. Bass/treble, multiple staves, all meters. MIDI optional. IBM/Epson/Star printers, CGA/Hercules graphics. $89.95. Send for free sample output.
SongWright Software
Route 1, Box 83
Lovettesville, VA 22080
(703) 822-9068

TO PLACE YOUR
AD IN
PC Magazine
Classified
Marketplace
Call (212) 503-5115

PREVENTATIVE MAINTENANCE

Memory Minder

Memory Minder is the most comprehensive disk diagnostic program available for microcomputers. Any operator can quickly and easily check the vital operating parameters of their floppy drives, including spindle speed, head alignment, read sensitivity and others. Run Memory Minder before vital data backup operations. Use it to align the drives without the use of an oscilloscope.

IBM PC, XT, AT program and manual $70
Precision Alignment Diskettes sold separately $40 each. 5.25" 40 track, 5.25" 80 track, 1.2 MB AT, or 3.5" 80 track drives.

J&M Systems, Ltd.
15100-A Central SE
Albuquerque, New Mexico 87123
505/292-4182
We accept MasterCard and Visa

CIRCLE 761 ON READER SERVICE CARD

MAINTENANCE & INSPECTION

An easy-to-use computerized method to organize, operate, and control an effective preventive maintenance system. Applicable to any type of business or industry. Full screen input and displays, plus function key help command. Maintains historical data, creates work orders, and provides numerous reports. For info, write to
PENGUIN COMPUTER CONSULTANTS
P.O. Box 20485
San Jose, CA 95160
(408) 997-7703

PROGRAMMERS TOOLS

db/LIB™

Relational Database Management with QuickBASIC!

db/LIB's 3 application-building libraries expand your QuickBASIC into full-function programmable DBMS.

- ☑ **High-powered assembly routines link to QuickBASIC:**
  - Create, read, write data files with billions of records.
  - Instant file access with full B-tree indexing system.
  - Conforms to dBASE III+ NDX and DBF file standard.
  - Compact, completely tested and full documented.
- ☑ **Complete Data Management programs w/Basic source:**
  - Create, Browse, List, Index, Append, & seven more.
  - Run stand-alone or merge into your own programs.
- ☑ **Built-in Database Query Language saves days of coding:**
  - Dynamically selects and formats record output.
  - Understands dBASE or Basic expressions.

db/LIB is only $139 complete.

AJS PUBLISHING, INC.
P.O. Box 378
North Hollywood, CA 91603

Call toll-free:
(800) 992-3383
In Calif. (818) 985-3383

Featured in the Microsoft Value Pack Catalog.

CIRCLE 832 ON READER SERVICE CARD

Turbo Pascal Programmers!

Blaise Computing, dedicated to providing quality software development tools since 1982, supports Turbo Pascal 4.0.

POWER TOOLS PLUS
- TSR support
- Direct video access
- VGA and EGA support
- Windows and menus
- DOS memory allocation
- Interrupt service routines

ASYNCH PLUS
- Interrupt-driven
- Speeds to 19.2K baud
- Four ports on PS/2 systems
- XON/XOFF protocol
- Hardware handshaking
- XModem with CRC

Both packages include source code, a comprehensive user reference manual, extensive examples and full program samples on the distribution diskettes. Blaise Computing has a full line of products for Microsoft C and Pascal as well as Turbo C and Pascal.

BLAISE COMPUTING INC.

Call 800-333-8087 today [illegible] for your free brochure.

CIRCLE 762 ON READER SERVICE CARD

PROGRAM/MANUAL DOC's ON-LINE

DocuMotion, a pop-up documentation utility, gives immediate access to source code documentation, manual etc. Build cross-index document libraries from any text file. Powerful print and copy capabilities. Folding document, ten window bookmarks, search, LAN compatible, more. FREE DEMO
NWP-Intelligent Solutions, Inc.
P.O. Box 20478
Bloomington, MN 55420-0478
(612) 884-5860

TURBO PLUS $99.95

Programming tools for Turbo Pascal 4.0 Screen Painter, Code Generator, I/O Fields, Dynamic Menus, Programming Unit Libraries, Sample Programs, 280 Page Illustrated Manual. 60 Day Satisfaction Guarantee! Brochures & Demo Diskettes avail. Highly Favorable Reviews! IBM & Compatibles.
Nostradamus Inc.
3191 South Valley St (Suite 252)
Salt Lake City, UT 84109
(801) 487-9662

TURBOCHARGE YOUR KEYBOARD

EXPERT KEY saves you keystrokes. Type long words/phrases only once. From then on you only need a few keystrokes. It's all automatic. No macro keys to program or remember. Just a single Hot Key. How? Expert Key LEARNS your words from the keyboard and screen. As you start typing a word, a highlighted guess pops up- a smart guess, right at the cursor. Just hit the hot key and the word is complete, or keep typing and the guess is gone. It's fun & never gets in your way. Learns editing sequences and recalls previous command lines. 30 day guar. for PC/XT/AT. $65 SPECIAL (Reg. $95) + $3 S&H, CA res. add 6.5%
Newell Technologies, Inc.
27758 Santa Margarita Pkwy. Suite 330N
Mission Viejo, Cal. 92691
(714) 583-7848

PROGRAMMERS TOOLS

Free SPF/PC™

Interactive demonstration disk, V2.0. Yours for the asking!

Command Technology Corporation, 1900 Mountain Blvd., Oakland, CA 94611
Telephone: (415)339-3530 Telex: 509330 COMMANO TECH

CIRCLE 833 ON READER SERVICE CARD

QuickBASIC Programmers

We have the tools to make your programs faster, smaller and more professional in appearance. We also give you important functions missing in QB. We even have a package that lets you make your QB programs memory-resident in as little as 8K of memory!
Call Toll Free or write for detailed information with no strings attached.

1-800-922-3383 • 404-973-9272

MicroHelp, Inc. • 2220 Carlyle Drive • Marietta, GA 30062

CIRCLE 834 ON READER SERVICE CARD

FREE BUYER'S GUIDE

Call or write for our FREE comprehensive Buyer's Guide containing hundreds of languages, utilities and applications specifically for IBM personal computers and compatibles. We're the world's leading independent dealer of programmer's development tools because we provide sound advice, low discount prices, fast delivery, FREE domestic shipping and no hidden charges.

Programmer's Connection
7249 Whipple Ave. NW
North Canton, Ohio 44720
800-336-1166 USA
216-494-3781 OH & AK (Collect)
800-225-1166 Canada
216-494-5260 FAX
9102406879 Telex
216-494-3781 International

CIRCLE 763 ON READER SERVICE CARD

SOURCE CODE

Modular and fully documented Assembly and C source code. Many programs are memory resident. All will run on any IBM PC, XT, AT or compatible.

• Calculator	64.95
• Dir/File Manager	49.95
• DOS Anywhere	64.95

Write or call to order source for these or other programs. Demo disk and brochure available.

SaySoft
10301 Lake Ave. Suite 617
Cleveland, OH 44102
(216) 651-3250

CIRCLE 757 ON READER SERVICE CARD

SIMPLE SCREENS

Turbo C users: Forget printf! Forget scanf! Instead use pop-up windows, easy data entry and validation, WYSIWYG screen design and maintenance. Functions are so easy to recall you will quickly shelve your manual. Requires IBM PC, XT, AT or true compatible. $50, checks only. No royalties.
Dannenburg Software
4362 SE Old Orchard Ct.
Milwaukie, OR 97267
503-659-2808

PUBLIC DOMAIN

$3.00 SOFTWARE FOR IBMPC

Hundreds to choose from, wordprocessors, data bases, spreadsheets, games, x-rated, lotto, communications, business, music, bible, art, education, language and useful utilities for making your computer easier to learn. Most programs have documentation on the disk. Write for your FREE catalog today!
BEST BITS & BYTES
P.O. Box 8245 Dept. M
Van Nuys, CA 91409
(818) 781-9975

PUBLIC DOMAIN

SaleMaker™

Client Management & Telemarketing Software

- Very easy to learn & use
- User-customizable for any business
- Lightning fast file access
- Inbound & outbound telemarketing
- Schedules calls and call-backs
- Autodials your phone
- Records contact history & notes
- Tracks lead sources
- Word processor built-in
- Instant follow-up letters & labels
- Mail merge for targeted direct marketing
- Generates custom management reports
- Pop-up windows, full color screens
- Unlimited file capacity
- Imports & exports ASCII files
- Over 95 searchable data entry fields
- Single-user & true LAN versions available

Editor's Choice

PC MAGAZINE

"A very well rounded system with broad functionality and excellent screen design. It is also fast and easy to operate. a hard package to beat." PC Magazine 12-22-87

Nominated for 1987 Award for Technical Excellence for Application Software!

Reduce costs. Increase Sales. Call today for free information.

1-800-433-5355

(214) 264-2626 in Texas

SaleMaker Software
Box 531650 Grand Prairie TX 75053

CIRCLE 836 ON READER SERVICE CARD

1-800-843-5084
Call for FREE catalog!!!

PEOPLE'S CHOICE Personal Computers

IBM Shareware/Public-Domain collection conveniently available for only $3.75/disk FULL!

Over 1600 selected programs PACKED together on just 220 diskettes, each diskette made available for only $3.75! Our FREE catalog offers an extraordinary range of programs, including WORD PROCESSORS, GAMES, PERSONAL FINANCE, PROGRAMMING LANGUAGES, ACCOUNTING, UTILITIES FOR DISK AND PRINTERS AND SCREEN, LOTUS WORKALIKES, DATABASE PROGRAMS, and much, much more!!

Orders shipped on Visa, MasterCard, or COD — but the catalog is **free!**

P.O. Box 7087 Warner Robins, GA 31095

CIRCLE 769 ON READER SERVICE CARD

PC MAG SPECIAL FOR IBM SOFTWARE

Receive a Personal Finance Manager, Word Processor Mailing List Program, 7 Fun Games, Spreadsheet plus our extensive catalog for ONLY $8.95 (plus s/h) VISA, MC, C.O.D. (+ $2.00)

MICRO STAR
P.O. Box 4078
Leucadia, CA 92024
Call Toll Free
National (800) 443-6103
California (800) 443-7430

CIRCLE 569 ON READER SERVICE CARD

INCREDIBLE SOFTWARE

For IBM/Compatible Computers.
Get a Word Processor, Spreadsheet, Database, Money Manager, 5 arcade games plus our 10,000 program catalog for ONLY $10.00 (+s/h) VISA, MC, AMEX (COD +1.90)

International Software Library
511-104 Encinitas Blvd.
Encinitas, Ca. 92024
800-992-1992 (National)
800-992-1993 (Ca only)

CIRCLE 758 ON READER SERVICE CARD

FREE DISK CATALOG!
Large selection of P.D./Shareware programs. Business, games, utilities, etc. Over 1500 of the best programs, as described in our free disk catalog! Orders shipped within 24 hrs! $3.00/per 5.25" disk, and $4.00 per 3.5" disk. Each one packed full of useful programs. Call today! MC/VISA.
GLW Software
P.O. Box 14008
Arlington, TX 76094-1008
817-265-2007

IBM P.D. SOFTWARE
Send stamp for catalog on disk. We have the best selection of Public Domain & Shareware for IBM & compatibles available. We offer hundreds of DSDD disks with Work Pro/Games/Util. & so much more for business or home use. At $3.00 per 5.25" & $5.00 per 3.5" Fastest service around. MC & VISA
JDX/PC
P.O. Box 1561
Corona, CA 91718
(714) 734-7075

GREAT SOFTWARE! GREAT PRICES!

Cream of the crop shareware for the IBM - PC and compatible. Finance, programming, games, utilities, graphics, education and much more! Large 32 pg. catalogue with full descriptions *FREE!* Prices as low as $2.00 each! Visa, Mastercards & COD Welcome. Call or write for a free catalogue!

Computer Solutions
P.O. Box 354
Mason, MI 48854
1-800-874-9378
1-517-628-2943

CIRCLE 703 ON READER SERVICE CARD

****1-800-262-6053****
IBM P.D. & User Supported software, as low as $1.25 per diskette - 3.5" diskettes available. If you are curious or a long time user, call our 24 hour order line and ask for a free catalogue. The newest and best, all types, from accounting to word processing. Call NOW! (MS 601-428-5722)
SOFTWARE CAFE
1125 West 10th St.
Laurel, MS 39442
1-800-262-6053 24 hrs.

PUBLIC DOMAIN
Public Domain and user supported software for IBM and compatibles.
- Video Training Tapes Available
- 100's of disk and 1000's programs
- Low as $1.25 per FULL disk
- Send $2 (refundable) for directory disk set

Visa/MC accepted
US/PD LIBRARY
P.O. Box 119
Clinton, TN 37716
615-457-3317 (After 4 pm)

FORTY PROGRAMS FOR $30.00
Best collection of IBM Public Domain Software
- Business, Accounting, Word Process, Graphics, Spreadsheet, Database, Lotus Templates, more
- Home Use; Budget, Inventory, Checkbook, others.
- Games; wide selection of educational levels.

Helpful instruction manual included. All for $30 + $3.50 s/h, Visa/MC accepted
PC PRODUCTS
2216 Illinois
Boise, ID 83706
800/682-6528 ext. 956

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

REAL ESTATE

Tennant-Trac

"The ultimate property manager"

Designed by PC IDEAL and a professional property manager for maximum efficiency and ease of use

★Apartments★ Office Buildings★ Real estate investments★

Trac- t to 2000 units easily and efficiently
Trac- All tenant data, lease terms and conditions
Trac- All financial data, accounts receivable and payable
Trac- All monthly, yearly financials and generate reports

Your profits can be maximized for only $129
Call now for more info: **1-800-634-5641**
OR
Send check or money order to:
PC IDEAL, 650 Sentry Park Way, Suite 1, Blue Bell, PA 19422

"Superior to systems costing over 10X as much $"

CIRCLE 840 ON READER SERVICE CARD

THE COMPLETE REAL ESTATE SERIES
'Helping Thousands Make Millions' since 1985. The most complete CPA/Auditor tested and approved series of Real Estate programs available anywhere! The industry leader! The series includes: Complete Property Manager-II ($795), Complete Real Estate Investor ($495), Complete Money Manager ($195), Complete Credit Checker ($249), Complete Property Tracker ($495) & 1031 Decisions ($995). For demo ($15) and/or literature call
ISOLUTIONS! PUBLISHING INC
8016 Plainfield Road
Cincinnati, OH 45236
800-255-6643 or 513-891-6145

REAL - HELP!™ $69.95
INVESTMENT ANALYSIS
Detailed analysis forecasting long/short term Return On Investments using "what if" situations. AMORTIZATION schedules that compensate for variable int./payments, balloon or full term. DATABASE with powerful sort/search function. Payment comparison to define your best terms. CK/MC/VISA
Accurate Investment Co.
P.O. Box 42002
Plymouth, Mn. 55442
(612) 559-8375

DEED DESCRIPTION ANALYZER
Simple plotting of deeds to scale on screen or printer. Accepts curves, lee, chains, poles, rods & varas. Find acreage, sq. ft. & closure errors. Edit permanent disk files. Designed for non-surveyors. Comprehensive manual. Users include attorneys, realtors, bankers and appraisers. $49.95 VC/MC/CK
GREENBRIER GRAPHICS, INC.
1102 Main St. P.O. Box 724
Rainelle, WV 25962
(304) 438-6157

Real Estate *continues . . .*

REAL ESTATE

L-PLOT...
A Metes & Bounds program to plot/print plats of any scale- Any description- use Any measurement! Calc. areas, error of closure, plots multi tracts. IBM/compat with monographics, CGA or EGA capability. $190. Or send $15 for real working demo, refundable with order. Visa/MC/chk. Free info.
LAN/SCAN, Inc.
P.O. Box 6863
Abilene, TX 79608
(214) 824-6419

BUILDING SEARCH™
Software developed by commercial broker. Instant access to your own inhouse MLS for all commercial office data in your market. Ability to query over 128 different variables. Prof'l presentation quality printouts manual and demo software available for $29.95. Ask about our nationwide user networks.
LeaseLine, Inc.
11776 Jollyville Road - Suite 200
Austin, TX 78759
(512) 250-0505

MANAGEMENT & ANALYSIS
* "Real Property Management" $395/$595 for residential & commercial properties and other bldg'g. Flags delinq'l tenants, prints budgets, checks, invoices & 1099S. No retyping of recurring data. * "Real Analyzer" $195, when deciding: buy/sell, exchange, or refinance. 30 day money back guarantee.
REAL-COMP INC
P.O. Box 1210
Cupertino, CA 95015
(408) 996-1160

PROPERTY MANAGEMENT
Since 1978 over 6,500 users of our software have found it comprehensive, flexible and easy to use. We offer systems to manage the following types of properties: COMMERCIAL/RESIDENTIAL/CONDOMINIUM/HOMEOWNERS ASSOC./MINI-STORAGE FACILITIES.
For more info. and sample printouts call:
REALTY AUTOMATION
1136 Eastshire Dr.
Hayden Lake, ID 83835
(208) 772-3259

PROPERTY MANAGEMENT
Rental-Ease. New state of the art property management software. Extremely fast and easy to use. Everything is included, tenant tracking, repairs and maintenance, income and expense, check writing. No extra modules to buy. The ultimate in property management. $695 complete. Call for Demo or Brochure.
STRATEGIC OFFICE SYSTEMS
9129 Mallard Circle
Sandy, Utah 84093
801-942-6784 8am-5pm mountain time

PROPERTY MANAGEMENT
Comprehensive program for managing residential and commercial properties. Many management reports including operating statement, delinquent rent, lease expiration and transaction register report. Provides check writing, check reconciliation, posting of late fees, recurring expenses—$495. Investment Analysis—$245.
YARDI SYSTEMS, INC.
930 Laguna Street
Santa Barbara, CA 93101
805-966-3666

RELIGION

SEARCH THE BIBLE IN 2 SECONDS OR LESS.

WORDsearch™ is the world's fastest, most advanced NIV Bible concordance software.

Instantly locate all relevant passages by word, phrase, or word combinations. And you can transfer Bible verses to most word processors.

$189.95 plus $5 p&h. Full-function demo, $7. Call about our 30-day no-risk free trial.

800-888-9898
5014 Lakeview, Austin, TX 78732

WORD Search™
CIRCLE 781 ON READER SERVICE CARD

Search the Scriptures Resident

Pop-up, memory resident Bible available at any time, from any program.

Copies verses directly into your word processor.

Searches the Bible quickly for any word or phrase.

$185. Demo available. Call 1-800-255-8602 (in LA 318-322-0897).

BibleSoft, Inc.
1300 Hudson Lane, Suite 10, Monroe, LA 71201
CIRCLE 846 ON READER SERVICE CARD

RELIGION

CHURCH SOFTWARE

POWERCHURCH PLUS!
Fast, friendly reliable church administration system. Membership, full fund accounting, contributions, payroll, payables, multi-user support, & much more - ALL for $695 complete! Compare us feature-for-feature against any over-priced package. We're helping thousands of churches with great software at a great price! FREE phone support, no time limit. No high-pressure sales pitch. To order your **FREE** full-working **DEMO** version call Customer Support.
F1 SOFTWARE
P.O. BOX 3096 BEVERLY HILLS, CA 90212
(213) 854-0865
CIRCLE 837 ON READER SERVICE CARD

SCRIPTURE SCANNER BIBLE ON DISKS

- **Search** the Bible in seconds for key words or phrases.
- **Print** any list or portion.
- **Write** sermons, lessons, etc. from your word processor or ours with access to scripture.

Priced from $179.95 to $669.95
CALL: **512-255-9569**
OMEGA
SOFTWARE
Box 355 Round Rock, TX 78680
CIRCLE 847 ON READER SERVICE CARD

BIBLESCAN
Search the entire Bible, a book, or chapter for a word or phrase. Display and/or print the related passages or a set of verses to help prepare sermons, classes, etc. Scan any topic. Excellent Bible study aide. Old Testament $39.95. New Testament $34.95 or Both for $64.95. Available for PC/XT/AT/PS2.
Highlands Computer Services
Route 5, Box 456
Abingdon, VA 24210
703-628-4299 Mon-Sat 9:00-6:00 EST

THE ULTIMATE BIBLE STUDY
Called "Sophisticated" and "entertaining" by PC Magazine (3/29/88), the Bookmaster Bible is becoming the new leader in Bible software. Powerful search modes, on-line help, report generator, footnotes and much more! New manual, free tutorial & 30-day moneyback guarantee. $235 for 6 disk set, $10 for demo.
Koala-T Software
3255 Wing St. Suite 220
San Diego, CA 92110
(619) 564-4371 for free info.

TO PLACE YOUR AD
IN PC Magazine
Classified Marketplace
Call (212) 503-5115

COMPUBIBLE

- **OUR FAMILY OF PROGRAMS HAVE MORE FEATURES THAN ANY OTHER PROGRAM OR YOUR MONEY BACK!**
- **Find any word or phrase in seconds!**
- **Access the Bible, insert verses and find words or phrases while using your word processor!**
- **KJV, ASV, NIV, NKJ, RSV**

For information on all products call or write:
NASSCO P.O. BOX 65800-222
Lubbock, TX 79464
(806) 866-4223 (800) 262-7726
CIRCLE 843 ON READER SERVICE CARD

PARISH DATA SYSTEM™
Comprehensive census/contribution program. Easy to operate, menu driven. Family, member, financial info & reports fully integrated. Selective lists, labels, contribution/tuition statements, personalized letters. User can create own reports, letters. Other church programs available. Over 1600 users. Free info.
Parish Data Systems, Inc.
3031 W. Northern Ave., Suite 121
Phoenix, AZ 85051
(602) 247-3341

SALES MARKETING

FOLLOW-UP
Software for Salespeople

Manage your sales activities with FOLLOW-UP. Track prospects by area, dollars, products, salesperson or any of 22 other entry fields. Fast & easy to use with on-line help at every point. Now in daily use by businesses of all types & sizes.

- Reminds you when to call
- Keeps history of previous calls
- Keeps Appointment Calendars
- Keeps track of other things to do
- Prints a wide range of reports
- Prints Mailing Labels
- Interfaces to your Word Processor & Mail Merge letters
- On screen Telemarketing to a group of names that you select
- Provides detailed sales forecasts.
- Imports data from ASCII files
- Transfers & merges data between computers using Follow-Up
- Has several data fields that you can define for your business
- Designed for use by salespeople, not computer experts.

$179.95

XYCAD Group
1877 St. Clair Ave.
Cleveland, Oh 44114
800-426-5457
In Ohio (216) 589-5788

SALES MARKETING

CLIENT-TRAC
"The Ultimate Competitive Edge"

CLIENT-TRAC - A PC IDEAL Business Software System specifically designed to give the Professional Salesperson a competitive edge while efficiently Managing a Larger Client Base, Increasing Sales, Improving Service, Maintaining Organization and Increasing Profits

CLIENT-TRAC allows you to easily
- TRAC thousands of clients efficiently
- TRAC clients by name, area, occupation, user-defined, etc
- TRAC all pertinent data for EVERY client such as last contact, extensive notes, results, actions, details on closing deals
- TRAC all "hot" leads daily
- multiple screen viewing
- produces mailing lists and reports (with graphics)

CLIENT-TRAC also includes the ability to easily
- TRAC weekly, monthly, year to date sales records and projections
- TRAC travel and entertainment expenses
- TRAC YOUR PERSONAL CALENDER of scheduled appointments

CLIENT-TRAC provides all the above in an easy to use, menu driven format with on-line support designed for the Professional Salesperson. Total utilization the system requires NO PROGRAMMING

Your Sales potential can be realized with **CLIENT-TRAC** for **ONLY $195**

For More Information Call PC IDEAL Today at **1-800-634-5641.**

Send Check / Money Order (PA residents add 6% sales tax)

PC IDEAL, 650 Sentry Park Way, Suite 1, Blue Bell PA 19422

CIRCLE 584 ON READER SERVICE CARD

The only software you really need-to get the most business out of each *Day*

Sales Ally

. . .a tool to increase your productivity

- fast access to client information
- keep your records organized
- make fast phone calls
- type letters and proposals
- invoice system, too.
- Save Time, Increase Sales
- Sales Ally Has It *ALL!*
- calendar
- calculator
- Mailing Labels
- Call-Back "Tickler"
- Free Phone Support

• Sales Ally is also designed for: telemarketing and network applications
(Versions also available for: Real Estate, Insurance and Stock Brokerage)

Call for Demo!!
215-242-8751 or 8750

SRI
Scherrer Resources, Inc.
Sales Systems Group
8100 Cherokee Street
Philadelphia, PA 19118

CIRCLE 783 ON READER SERVICE CARD

Lead Management System

ONLY $99.95 for the Next Generation in Sales Management.

Menu Driven - Daily To-Do & Top 10 Lists - Sales Forecasting - Expense Reports - Price Quotes - Complete Documentation - Spreadsheet - Word Processor - Direct Mail - Telemarketing

Powerhouse Systems Inc.
1-800-525-5774
1-919-721-0241
1022 W. First St. Ste 104
Winston-Salem,NC 27101

MC VISA

CIRCLE 784 ON READER SERVICE CARD

GREAT SALES PRESENTATIONS NEW CONCEPT — FREE DEMO

>>>> Show you have a better mousetrap
>>>> Recommend the best solution
>>>> Manage and close a complex sale

Proven tool for organizing professional sales presentations tailored to your customer's needs. DECISION PAD for PC's is $195, 30-day NO RISK. Or test-drive FREE DEMO DISK (limited time).

APIAN SOFTWARE
P.O. Box 1224
Menlo Park, CA 94026
(800) 237-4565 ext 125 or (415) 851-8496

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

SECURITY

DataCrypt
From the Creators of PROTEXT

DataCrypt – 1) A unique and unbreakable software encryption system designed to provide BUSINESSES, GOVERNMENT AGENCIES and INDIVIDUALS with TOP LEVEL SECURITY while retaining, receiving and transmitting classified information.

–Coded data is unbreakable (exceeds Data Encryption Standard)
–No "back door." Cannot be reverse engineered or "jammed"
–Menu driven and user friendly with on-line tutorial
–Encodes all types of files at speeds up to 100K cpm
–Every system produces unique codes based on unique keys
–Full control over encryption keys provides endless security
–Authentication, audit trail, verification, scanners and more

DataCrypt, the ultimate security system, can be obtained for $249
-or- inquire about a site license.

For TOP LEVEL security call **PC IDEAL** today at **1-800-634-5641**
-or- send check/money order to:

PC IDEAL, Inc. Executive Suites
650 Sentry Park, Suite #1, Blue Bell, PA 19422

"Finally, an IDEAL data security solution, DataCrypt."

CIRCLE 788 ON READER SERVICE CARD

EVERLOCK

PROTECTION

Designed for user-transparency, clone compatibility & strength. It features
- no need for damaged media or I/O plugs
- supports all Hard & Floppy disk formats
- No server networks supported
- variable number of installs (0-99)
- create demos with remote unlock option
- allows protected upgrades by modem BBS
- limit program use by date or count

$195 Starter Kit or $495 with NO meter counts. Free info & demo disk available

Az-Tech Software, Inc.
305 East Franklin
Richmond, MO 64085

(800) 227-0644 (816) 776-2700

CIRCLE 789 ON READER SERVICE CARD

BIT-LOCK® SECURITY

Piracy SURVIVAL 5 YEARS proves effectiveness of powerful multilayered security. Rapid decryption algorithms. Reliable/small port transparent security device. PARALLEL or SERIAL port. Countdown and timeout options also available. KEY-LOK™ security at about ½ BIT-LOCK cost.

MICROCOMPUTER APPLICATIONS
7805 S. Windermere Circle
Littleton, CO 80120
(303) 922-6410 or 798-7683

HANDS OFF THE PROGRAM®

PC SECURITY

HANDS OFF THE PROGRAM is an all software, privilege based, system security utility that prevents unauthorized access of your PC's subdirectories, files and disk drives.

HANDS OFF THE PROGRAM provides a sophisticated technique to separate up to 64 users of a PC, by privilege, into their own separate areas on the hard disk. Users may access only their own areas and any other area protected with a lower privilege.

HANDS OFF THE PROGRAM protects files on your hard disk by preventing unauthorized users from modifying the DOS file attributes (Read Only, Hidden, System). For example, use the READ ONLY attribute to prevent virus programs from invading your system.

HANDS OFF THE PROGRAM restricts access to your hard disk via "disk locking." A "locked" hard disk may not be booted, accessed by applications software or formatted via the DOS FORMAT command until it is "unlocked."

HANDS OFF THE PROGRAM incorporates advanced security techniques on PC's running PC-DOS V3.0 or higher. The DOS FORMAT of Drive C is prevented while the PC is in use, the security manager is protected against Control Break and a boot from floppy results in the automatic locking of Drive C.

HANDS OFF THE PROGRAM also provides
- Disk Encryption
- User Access Reporting
- Stops Common Viruses
- Mailbox
- Read Only and Execute Only privileges by user
- Auto installation

Price **$89.95**
add 3.75—shipping
Check, Money Order, VISA, MC accepted

Systems Consulting Inc.
412-963-1624
Box 111209, Pittsburgh, PA 15238-0609

CIRCLE 787 ON READER SERVICE CARD

Security *continues . . .*

SECURITY

STOP SOFTWARE PIRACY

With our Copy Protection Products. They really work and do not burden the honest user. . .

For Disk Security

High Level Security
- PADLOCK II DISK
- SAFEGUARD DISKS
- COUPON DISKS

For Hard Disk Protection
- HDCOPY

Low Level Security

User Installable Protection
- PC-PADLOCK

The market is filled with copy protection products which burden the user or simply don't work. We have over 2500 satisfied software firms utilizing our systems. The high-level fingerprint has not required an update in over 2 years.

Why should your valuable data or useful software program become available in the Public Domain?

Call or write for more information.

GLENCO ENGINEERING INC.
SERVING THE SOFTWARE INDUSTRY
721 West Algonquin Rd., Arlington Hts., IL 60005
(312) 364-SOFT
FAX 364-7698 Telex 493-7109

CIRCLE 783 ON READER SERVICE CARD

The world's leading software manufacturers depend on Softguard copy protection systems. Your FREE DISKETTE introduces you to SuperLock™ – invisible copy protection for IBM-PC (and compatibles) and Macintosh.

- Hard disk support
- No source code changes
- Customized versions
- LAN support
- New upgrades available

(408) 773-9680

SOFTGUARD SYSTEMS INC.
710 Lakeway, Suite 200
Sunnyvale, California 94086
FAX (408) 773-1405

COPY PROTECTION

SOFTGUARD

CIRCLE 791 ON READER SERVICE CARD

SHAREWARE

SAVE UP TO 74% ON SOFTWARE

When you buy software "off the shelf" you pay 50-74% for advertising, packaging and distribution. With Shareware the author lets you try his software at no risk. If you like it send him a donation. Send $1.00 for catalogue of over 800 Shareware programs. $2.95 per disk (Canada $3.95). 3.5" format available. In Canada Write: 269-C Springside Drive, Hamilton, Ontario L9B 1P8.

ALTERNATIVE PERSONAL SOFTWARE
P.O. Box 1370
Lewiston, NY 14092

SHAREWARE

BEST OF THE BEST

Shareware & Public Domain Software no min order! 1-4 $3.98 ea. 5-9 $3.48 ea. 10+ $2.98 ea. No s/h. 24 hr toll free order number. Orders shipped in 24 hrs. Visa/MC. Free disk catalog to first 25 callers. $2.25 there after or write for free mini catalog.

AFL INDUSTRIES - Software Division
213 Ward Circle Suite 202
Brentwood, TN 37027
ORDER-800-245-1516 OTHER 615-371-8388

SAVE 90% ON SOFTWARE!

Shareware programs compare favorably to commercial programs costing $200 and up! EZ Forms, Homebase, PC Key Draw, PC Outline, over 170 others to choose from, all for $6.95 or less per disk! Money-back guarantee. IBM, PC, XT, AT, jr, or compatibles. Call or send for FREE catalog.

SHAREWARE EXPRESS
32302 Camino Capistrano, Suite 204W
P. O. Box 219
San Juan Capistrano, CA 92693-0219
(714) 240-1322

FREE SOFTWARE CATALOGUE!

We have selected only the best software for your home or small business computer and put it into the most complete FREE catalogue available. We feature Games, Entertainment and unique Home Applications software. Also Education, Graphics, Finance, Wordprocessing and more. Just $4 per disk. MONEY BACK GUARANTEE. Write for free catalogue.

PC Arcade
276-P Morehouse Rd.
Easton, CT 06612

STATISTICS

High performance STATISTICAL SYSTEM

Limited time price $149.

STATS+

A powerful, elegant, and super-fast statistical package integrated with complete data management and dynamic graphs. Comprehensive selection of descriptive, inferential, and exploratory statistics with forecasting. STATS+ features intelligent, two-way interfaces to data from Lotus, Symphony, dBIII+, and other programs. **For more info look for our ads in most computer journals, ask your dealer, or contact StatSoft.** Price $245 (+$5 ship/hand).

StatSoft

2325 E. 13th St., Tulsa, OK 74104
(918) 583-4149

Overseas offices: **StatSoft of Europe** (Hamburg, FRG) ph. 040 4200347; **StatSoft UK** (London, UK) ph. 07072 71166; **Hearne Software** (Melbourne, Australia) ph. 613-497-4276

CIRCLE 794 ON READER SERVICE CARD

STATA

Statistics and graphics join to make **STATA** the most powerful package for the **PC.** No comparable program is as **fast,** friendly, and accurate. $20 Demo. Quantity discount available. Call toll-free for more information.

1-800-STATAPC
Computing Resource Center
10801 National Boulevard, Los Angeles, CA 90064
(213) 470-4341

CIRCLE 844 ON READER SERVICE CARD

MINITAB'S a PC of cake!

MINITAB features intuitive commands for comprehensive data analysis. Includes basic statistics • regression • time series • tabulation • ANOVA • plots • histograms • much more. DOS based version includes LOTUS interface, hi-res graphics, no copy protection. Used in over 60% of Fortune 50 companies. For free brochure call 814/238-3280.

MINITAB
STATISTICAL SOFTWARE

Minitab, Inc.
3081 Enterprise Dr., State College, PA 16801

CIRCLE 771 ON READER SERVICE CARD

RATS!!

Best-selling and most comprehensive econometrics & forecasting software available. Combines regression, time series and forecasting with data base management and high res graphics. All for only $300. Call today and find out how RATS can help you!!

1-800-822-8038

VAR Econometrics
P.O. Box 1818 Evanston, IL 60204
(312) 864-8772

CIRCLE 782 ON READER SERVICE CARD

BELIEVE IT!

StatPac Gold™ with the Forecast Plus™ Option is the Most Powerful Statistical Analysis and Forecasting Package Available for the Microcomputer

FREE Comprehensive Brochure:
1-800-328-4907

WALONICK ASSOCIATES, INC.
6500 Nicollet Ave. S., Minneapolis, MN 55423
(612) 866-9022

CIRCLE 786 ON READER SERVICE CARD

THE BASS SYSTEM

BASSBase + BASSStat + BASSView = Power! For data management/analysis/report generation. The SYSTEM 384K and 2-3½" drives or onehard disk. $229 thru 8/31/88. microBASS 256K and 2 floppies $95.

Call or write for information:
BASS Institute Inc.
P.O. Box 349
Chapel Hill, NC 27514
(919) 489-0729 or BB (919) 489-9665 (N,8,1)

MARKETING SCIENCE SOFTWARE

For PC's .. (1) RXCON Conjoint w/plan generator, graphics, help key, more! (2) RXMAP Perceptual mapping, (3) RXTAB Cross-tab pkg with (4) RXSTAT, 33 stat routines. Unlimited banners, sample size, and on-screen table generator! New 3D graphics! 15 Disks, 600 pg manual, demos, tutorials included. New programs, upgrades, as released! All for Annual membership of only $195! VISA MC AMEX.

MKT SCIENCE SOFTWARE ASSOC.
Educational div of Datalogics
1-800-992-0422/PA 215-794-3517

PC MAGAZINE

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

MARKETPLACE

STATISTICS

The One You Can Rely On
BMDP offers the most comprehensive collection of programs for data analysis, backed by comprehensive documentation & competent technical support. BMDP was the 1st stat package ever developed and the BMDP programs have been trusted by statisticians more than 20 years. Hard disk req'd. Call for brochure

BMDP
STATISTICAL SOFTWARE
BMDP Statistical Software, Inc.
1440 Sepulveda Blvd.
Los Angeles, CA 90025
(213) 479-7799

STATISTIX - ONLY $169!
STATISTIX is a powerful and very easy-to-use statistical system for PC's. Used by many universities, businesses, fed and state governments and research organizations. Check us out before you buy a statistics program; you'll agree SX is a "best buy"! SATISFACTION GUARANTEED. For more info
NH ANALYTICAL SOFTWARE
PO BOX 13204
Roseville, MN 55113
(612) 631-2852

NCSS plus-$99
Easy-to-use menus & spread sheet. Multiple regression, T-tests, ANOVA (up to 10 factors, rep. measures, covariance). Forecasting. Factor, cluster, & discriminant analysis. Nonparametrics. Cross Tabulation. Plots: histograms, box, scatter, stemleaf. Sort. Subset. Transformations. Reads ASCII. New graphics Pkg. $59.
NCSS
865 East 400 North
Kaysville, UT 84037
Phone: 801-546-0445

STAT PLAN III
Easiest to use statistics program available. Complete range of statistics-curve fitting, crosstabs, correlation, multiple regression, T-tests, etc. Graphics with printer/plotter output. Capable of handling over 50,000 data points, interfaced directly with lotus files. Demo diskette available. MC/VISA. Only $179
THE FUTURES GROUP-STAT PLAN III
76 Eastern Blvd., Dept. C
Glastonbury, CT 06033-1264
(203) 633-3501

SIGSTAT
SIGSTAT includes over 70 programs of the BMD statistical series, plus many advanced new features. Mainframe capacity (up to 80 var.) for uni—(e.g., ANOVA, regression) + multivariate (e.g., canonical, factor,) analyses, time-series, multidim scaling, crosstab, plots, q/c and more. 8087 support opt.256K, DOS, $595.
SIGNIFICANT STATISTICS
3336 N. Canyon Road
Provo, UT 84604
(801) 377-4860

BASEBALL * * BOWLING
BASEBALL LEAGUE STATS - maintains a full set of batting, fielding and pitching statistics and complete game by game histories. BOWLING LEAGUE SECRETARY - maintains and updates all necessary records for teams and individuals in small or large leagues. Baseball - $39.95. Bowling - $44.95. Visa/MC.
Mighty Byte Computer, Inc
6040 A Six Forks Rd., Suite 223F
Raleigh, North Carolina 27609
1-800-237-7072

SURVEYS

THE SURVEY SYSTEM
An easy to use menu driven system for the entry, editing, processing and presentation of questionnaire data. The system can produce camera ready crosstabs and other tables in banner format. Also statistics and bar charts. Regression and open-end coding/analysis options available
CREATIVE RESEARCH SYSTEMS
15 Lone Oak Ctr., Dept. P
Petaluma, CA 94952
(707) 765-1001

SURVEY MATE
The integrated survey package: fast & accurate data entry with automatic values, range, logic checks, age calc, verification, verbatim entry/report for open-ends. Frequencies. Recoding. Crosstabs, Regression, ASCII file export, up to 1000 fields. Users in 41 countries, $145, 60 day Money-back Guarantee
Henry Elkins & Associates Inc
15 Willow Circle
Bronxville, NY 10708
914-961-7375 Ord: 800-622-4070, 800-942-7317

TERMINAL EMULATION

BARR High-Performance RJE Workstations

BARR/SNA RJE and BARR/HASP are communications hardware/software packages for the IBM PC and PS/2 series of computers.

Full featured:
- multiple printers,
- unattended operation,
- print speed beyond 6,000 lpm,
- special forms,
- line speed to 56,000 bps,
- dial-up or dedicated lines, and
- serve as a LAN gateway.

BARR/SNA RJE emulates IBM 3777-3 in an SNA environment. BARR/HASP emulates IBM 3777-2 and HASP on the 360/20. BARR communications software is also available with PC-SYNC internal modems: 208AB, 201C, 9600.

BARR
Barr Systems, Inc.
2800 NW 41 St. Bldg M
Gainesville, FL 32606
800-BARRSYS or
904-371-3050
CIRCLE 795 ON READER SERVICE CARD

UTILITIES

Ammunition to conquer your biggest problems!

- The **Virtual Expanded Memory Manager** provides your EMS applications with up to eight megabytes of expanded memory
- It turns PC/AT or PS/2 extended memory into expanded memory
- It turns hard disk storage into expanded memory
- It is compatible with most EMS applications, including 1-2-3 and Symphony

PC MAGAZINE EDITORS' CHOICE

- *Only $89.95. 30-day money-back guarantee*

V-EMM™
Fort's Software
P.O. Box 396
Manhattan, KS 66502
(913) 537-2897
CIRCLE 796 ON READER SERVICE CARD

HERCULES OWNERS

Athena BIOS™
This unique software and hardware solution allows up to 95% of existing CGA software to run without modification on Hercules adapters. Outperforms all others (see PC Magazine, Nov 24, 1987 pp 28 and 48). Runs on PC, XT, AT, L.E. and compatibles - all Hercules adapters. Software - $40, with emulation adapter - $60.

ATHENA DIGITAL
2351 College Station Rd. Suite 567 / Athens, GA 30605. Phone 404/354-4522.
CIRCLE 754 ON READER SERVICE CARD

UTILITIES

BACK-IT & Q-DOS II
Back-it. Backs up 10 MB in 4 min. Backs up to & restores from any DOS device. Formats, verifies and backs up to floppies in one step. $55 & $4 s/h. Q-DOS II simplifies DOS commands with blazingly fast speed. $39 & $4 s/h. Easy to learn & use. Demo $3. Check, MC/VISA.
CARTER MARKETING
P.O. Box 672
Coarsegold, CA 93614
(209) 658-7532

BREAK 640K!
Why buy expensive boards? VRAM™ gives your PC/XT/AT or PS/2 8 megabytes of memory by turning disk space into expanded memory! Use extended memory for expanded memory. Create VERY LARGE worksheets. FAST. 640K not required. Use with 1-2-3, Symphony, and other EMS programs. $49 + $3 s/h
BIOLOGIC COMPANY
11982 Coverstone Hill Circle, Ste 1622
Manassas, VA 22110
(703) 368-2949/Chk-COD

Opt-Tech Sort/Merge 3.0
Extremely fast Sort/Merge program. Run as a DOS command or CALL as a subroutine. Unlimited filesizes, most languages, datatypes & filetypes supported including Btrieve and dBASE II & III. Advanced features include record selection, record reformatting & much more! Call or write for more info. MS-DOS $149. Zenix $249
Opt-Tech Data Processing
P.O. Box 678
Zephyr Cove, NV 89448
(702) 588-3737

AT's DON'T NEED 360KB DRIVES

Allows copying of IBM AT files for use on IBM PCs, XTs and compatibles with no hardware or software modifications. A 360K floppy drive is not required. CPYAT2PC may reside on your IBM AT hard disk and copies 1 file or entire subdirectories in 1 step. Price $79. + $4 s/h

MICROBRIDGE COMPUTERS INTERNATIONAL, INC.
655 Sky Way - Suite 125
San Carlos, CA 94070
1-800-523-8777
(CA) 415-593-8777
(NY) 212-334-1858
CIRCLE 801 ON READER SERVICE CARD

E·X·T·R·A™
A Menu System to Manage Memory Resident Programs

- Run up to 26 TSRs using only the memory of the largest TSR • Single hot key command accesses ALL TSRs • Create your own TSR menu and auto install instantly from EXTRA's program list • Toll-free technical support hotline • From the creators of Direct Access • $99

P.O. Box 1104
Eau Claire, WI 54702
Call Toll Free
1 800 242-6368
for Dealer Nearest You

DELTA TECHNOLOGY INTERNATIONAL
CIRCLE 800 ON READER SERVICE CARD

PC MAGAZINE MARKETPLACE

UTILITIES

RUN NOVELL WITHOUT KEYCARD
Protect Novell Network from crashing due to Keycard Failure
Break the 12MHZ server barrier
Free-up slot in server

NetSAFE for v2.X $99 US
Other products available for:
P-CAD CADKey CADvance Personal Designer

Nasdec

VISA or American Express

Include $10 shipping
Unit #72
125 Garry Street
Winnipeg, MB
Canada R3C 3P2
(204) 956-2798

Our products should not and are not intended for production of software for sale or trade or for any purpose that would deprive author of payment

CIRCLE 786 ON READER SERVICE CARD

This Screen Can Save Your Data

One or more of your scheduled backups is overdue, to check backup status and run Quiksave press F1, to abort press ESC

Why Pay More? Now Only:
$49.95
CIRCLE 841 ON READER SERVICE CARD

QUIKSAVE REMINDS YOU TO BACK UP YOUR HARD DISK...
...Then Automatically Backs Up For You!

The hit of the year is Quiksave. It will remind you when to backup daily, weekly or at any specified interval. Our unique warning system tells you the number of days since the last backup, which files have changed and a status report for all scheduled backups. Backs up 20 meg in 8 minutes on either 5.25" or 3.50" disks. Once you have seen Quiksave in operation, you will see why numerous FORTUNE 1000 companies such as NABISCO, COMPUSERVE, and CITIBANK and others backup daily using Quiksave. And it's PS/2 COMPATIBLE! Call:

1-800-888-8086
Micro Interfaces Corp, Miami, FL

DISKPACK
No.1 backup software. 10 Megs onto 2 floppies in 4 min! Compresses files. Copies to any DOS device (inc. tape). All other fast backup programs bypass DOS and are unreliable and don't work w/many clones. Please compare. Nothing else even comes close. Money back guarantee. $89 + $3sh.
BIOLOGIC COMPANY
11982 Coverstone Hill Circle, Suite 1622
Manassas, VA 22110
(703) 368-2949 Check/COD

LIMSIM
Expanded Memory Simulator for the 286 & 386 machines. Use the extended memory you already have as Lotus style Expanded Memory. PC Magazine (March 31, 1987) says "Easy to use and well documented." $70 ($100 with assembler source). 30 day money back guarantee. Visa/MC accepted
Larson Computing
1556 Halford Ave. #142
Santa Clara, CA 95051
(408) 737-0627

*****IBM Uses CP/M & Apple*****
"The best", "strongly recommended"-PC mag.
- Uniform copies files, reads & writes *directly* to 200 CP/M disk formats on the PC,XT,AT-by Micro Solutions. $62.95 + $3 S/H
- MatchPoint 1/2 card transfers Apple DOS, SOS, CP/M and ProDOS files to IBM PC,XT, AT-$185 + $3 S/H (includes FREE Uniform!).

Blue Heron
1108 S. Second St.
Dekalb, Illinois 60115
(815)758-2355

RECORD/PLAYBACK KEYSTROKES
TOTAL RECALL captures keystrokes while you use your programs. Play back your keystrokes and it runs your programs for you. TYPING EVERYTHING YOU DID. Save time! Less typing! For tutorials, audit trails, demos, QA tests, prob solving, recovery. Popup/batch, edit, 4 speeds, more! $79. 30 Day guar. Dealers too!
Computer Foundations
2604 Elmwood Avenue, Suite 320
Rochester, NY 14618
(716) 586-9756

SpeedStor

Hard Disk Integration and Partitioning Software

- For PC ATs, XTs and compatibles.
- Integrates virtually all 5¼ inch drives.
- Supports ST412, RLL, ESDI and SCSI controllers.
- Flexible partitioning, with volumes of any size.
- Spans multiple drives into a single volume.
- Includes trouble-shooting diagnostics.
- Powerful, yet extremely easy to use.

$99 (suggested retail)

EDITOR'S CHOICE
"If you have to make a hard disk drive and controller work together, . . . SpeedStor is a dream come true."

PC WEEK *"SpeedStor software makes installation simple and painless . . . its user interface is a joy to work with."*

Used by major disk drive and PC manufacturers. 250,000+ units sold.
Now available through Softsel dealers.

STORAGE DIMENSIONS
A Maxtor Company
981 University Ave., Los Gatos, CA 95030, (408) 395-2688
CIRCLE 797 ON READER SERVICE CARD

Oswego Software, Inc.

We've taught the IBM PC to read and write HP files!
$495
Call us, 312 554-3567
Oswego Software, Inc.
507 North Adams St.
Oswego, IL 60543
CIRCLE 576 ON READER SERVICE CARD

Package your Expertise
Knowhow is the expert application system for software knowledge. It integrates common user errors, product specs, special tricks, war stories, glossary into a single knowledge base, then asks did-you-do-this questions to resolve how-to and what-went-wrong inquiries.
Build your own Knowledge Base or start with one of ours. Not an ES shell – if you can construct 'this happens when' statements, you can build a Knowhow knowledge base. The ultimate documentation for turnkey applications, VAR toolkits, tech support, training followup.
Not convinced? Ask for our Demo disk, $20.

This Is How
Suite 28-281
4444 FM 1960 W.
Houston, TX 77068
(713) 289-4300
CIRCLE 807 ON READER SERVICE CARD

CM-MENU SYSTEM
The COMPUTER MANAGER provides you with a user defined menu to access instantly all the different application programs on the hard disk. Powerful menu generator. User programmable to perform other tasks as well. You can issue DOS commands directly from the menu. Introductory price $29.85
DATA CONCEPTS
2277 W. 243rd St.
Lomita, CA 90717
To order call (213) 539-4836

RECALC 1-2-3 5X FASTER!
3-2-1 Blastoff compiles 1-2-3 formulas into code for 8087 math chip which loads with your worksheet into 1-2-3. Recalc 3 to 15 times faster and protect proprietary formulas. Use all 1-2-3 features, any size worksheet. "Hot Prospect" - PC Magazine. $124.95 with 30-day money-back guarantee.
FRONTLINE SYSTEMS, INC
P.O. Box 7408-PC
San Francisco, CA 94120-7408
800-451-0303 Ext 55, 916-677-7171

UTILITIES

SAVE TIME WITH VTOOLS!

Fast, easy to use toolkit full of timesaving programs improves your mood and efficiency! Programs to find files, display/sort directories, view/modify files in ASCII or hex format, relocate files, compare/update files, even a global "CD" command, plus much more! OS/2 compatible! Call toll free! $49.95 + $3 s/h. CA Tax. See our ad page 4

GOLDEN BOW SYSTEMS
2870 Fifth Avenue, Suite 201
San Diego, CA 92103
800-284-3269

$59.95!

Order the RED Utilities now! Programs include: Diskcache to speed hard and floppy disks. Printer spooler. Batch file compiler speeds batch files and protects source code. Path for data files. Wild card exceptions. Protect hard disk from formatting. Sort directories. 17 more programs. Visa, MC, Ck/mo.
Wenham Software Company
5 Burley Street
Wenham, MA 01984
617-774-7036 9am-9pm Mon-Fri 9am-5pm Sat

SEE CURRENT FILE ACTIVITY

WATCH-I-O. Pop-up utility that displays files open, DS:DX of open and last read/write, R/W counts, last exec, last open, last file-not-found. User can select hot-key, pop-up for file opens, pop-up for file-not-found, track file opens on printer. MC/Visa $49.95 w/antivirus opt. $69.95.
Quantum Publishing
23860 Miles Road
Cleveland, OH 44128
1-800-342-6237

SEARCH - REPLACE for 1-2-3

Finds and replaces strings of characters (labels, formulas or numbers) at 1,214 cells per sec. "Features just about all of the search and replace options that a spreadsheet user would want" . . . PC Magazine. "An absolute must for global modifications of worksheets" . . .
Symphony User $39.95 + $3.00 S/H.
SMI Corporation
P.O. Box 582221
Tulsa, OK 74158
(918) 560-9536 MC/VISA/COD/PO

RUN YOUR PC AUTOMATICALLY!

Specify what to run and when to run it and let Auto-Might do the rest. Run backups, communication, diagnostics or virtually any program/utility - unattended. Run software daily, weekly, monthly or years in advance. DOS 2.10 and up, IBM and compatibles. $49.95 + $4.00 s&h (Colo. add 7.1% tax)
The Pendulum Group, Inc.
333 W. Hampden Ave. Suite 1015
Englewood, Colorado 80110
(303) 781-0575

FILE-MANAGER 2000

An effective DOS alternative with all the commands necessary for complete disk/file maintenance. Easily installed/tailored to exclude unwanted commands. DisplayWrite users will appreciate LOCATE & VIEW for maintaining EBCDIC documents. Only $69.95 + $5.00 s/h
W.J. Osberg Services
3 Golf Center, Suite 159
P.O. Box 681489
Schaumburg, IL 60618
(312) 303-5341 Chk/MO/COD, VISA/MC

Fix Common Problems Fast

You don't need to be an expert to diagnose and correct problems involving PC setup. All you need is HELPME software! More than 300 tests. On-screen help for understanding and correcting identified problems. Quick identification of system configuration and compatibility. $99 + S/H. MC/VISA.

CALIFORNIA SOFTWARE PRODUCTS, INC.

CALIFORNIA SOFTWARE PRODUCTS, INC
525 N. Cabrillo Park Drive
Santa Ana, CA 92701
(714) 973-0440

WORD PROCESSING

WordPerfect™ Add-On ONLY $85

Turn WordPerfect™ into a Scientific Word Processor

- Supports WordPerfect 4.2 or 5.0.
- Display and print complete Greek and math symbol sets.
- Custom printer definitions and macros included free of charge for WordPerfect owners.
- Includes custom display chip or video card download program.
- Includes Hewlett Packard LaserJet™ support or font download program for dot matrix printer.
- New! Large or 10-point scientific character set available for HP LaserJet™. Large 150; 10-pt. $75.
- Write or call for flyer, supported hardware, and ordering information.

swpe 8320 N. Lockwood Avenue Skokie, IL 60077-2442 U.S.A. Phone: (312) 677-4270

CIRCLE 569 ON READER SERVICE CARD

FARSI/GREEK/ARABIC/RUSSIAN

Hebrew, all European, Scand. plus either Hindi, Punjabi, Bengali, Gujarati, Tamil, Thai, Korean, Viet, or IPA. Full-featured multi-language word-processor supports on-screen foreign characters and NLQ printing w/no hardware modifications. Includes Font Editor. $355 dot matrix, $150 add'l for laser; $19 demo. S/H in U.S. incl'd. Req. PC, 650K, graphics.
30 day guarantee.
GAMMA PRODUCTIONS, INC
710 Wilshire Blvd. Suite 609
Santa Monica, CA 90401
(213) 394-8622 MC/VISA/AMEX

WORD PROCESSING

CompareRite™

"Outstanding software – the best of its kind... CompareRite compares documents in ways that I didn't think were possible. It's utterly amazing."
– John Dvorak, PC Magazine, 3/15/88

CompareRite saves hours of editing by showing you how any two documents differ. Amazingly fast, CompareRite will create a complete comparison draft, ready for printing, or display the changes on the screen so you can scan them. The program shows changes in many user-selectable formats, and is compatible with all major word processing programs.

CompareRite is perfect for attorneys, editors, proofreaders or anyone who has to make or compare drafts. Thousands in use.

Price — $129.95 + $5 shipping/handling

JURISOFT INCORPORATED
763 Massachusetts Avenue
Cambridge, MA 02139
(Outside MA) 800-262-5656 Ext. 10 (In MA) 617-864-6151 Ext. 10

CIRCLE 804 ON READER SERVICE CARD

$19 SOFTWARE™

QUALITY, UTILITY, and FAIR prices!!!!!

- **EZ-FORMS™** - Premier forms processor. Full C30 version - the real thing! Only $19
- **EZ-FORMS EXECUTVE™** Ver. 2. 100+ incl. forms, more features. Only $89
- **EZ-SPREADSHEET™** - be a pro fast! - $19
- **EZX-WRITE™** - WordStar compatible, lightning speed! Much, more. Only $19
- **EZX-BASE™** - Quick data mgt.! - $19
- **EZX-TALK™** - com. for modems - $19
- **EZX-MENU™** - hard disk manager - $19

S&H $5/US48, $9/AK/HI/PR/Canada. $19 fgn. Texas tax 6%. M.O., USA cks ok. ©1988 **$19 Dollar Software** div. EZX Corp. 403 E. NASA, #19, Webster TX 77598

VISA/MC/AX ORDERS ONLY PLEASE: **800/999-19-SW** ext. MB19
Info./Cust.Svc. **713/338-2238** ext. MB19

CIRCLE 803 ON READER SERVICE CARD

World's Bilingual Word

DuangJan, bilingual word processor for English and Armenian, Bengali, Euro/Latin, Greek, Hindi, Khmer, Lao, Punjabi, Russian, Sinhalese, Tamil, Thai, Viet. $109 + $5 s/h (foreign + $12 s/h). Font editor included. For IBM compatible with dot-matrix & LaserJet printer. Demo $6 + $1 s/h.
MegaChomp Company
3524 Cottman Avenue
Philadelphia, PA 19149-1606 USA
215-331-2748

PC-Write SHAREWRITER VER. 2.71

Fast, powerful word processor/text editor for IBM/XT/AT/PX. Spelling checker, screen clip, mailmerge, split screen. ASCII files, macros. Supports 4000 printers, incl. Laserjet + and Post Script. $16 for software, tutorial & guide on disk. $89 to register for manual, support, newsletter, & updates. 90-day Guarantee.
QUICKSOFT, INC
219 First North, #224-PMAC
Seattle, WA 98109
1-800-888-8088 (206) 282-0452 Visa/MC

MISCELLANEOUS ACCESSORIES

CompuCover®

KeySkin™ Keyboard Covers

Clear to the eye, Soft to the touch. KeySkin™ Covers stay on while you use your computer. Many different models to chose from. Call toll free

USA (800) 874-6391
FLA (800) 342-9008
CompuCover®
2104 Lewis Turner Blvd. (Dept. P1)
Ft. Walton Bch., Fl. 32548

CIRCLE 650 ON READER SERVICE CARD

DUST COVERS

- 100% Cotton Canvas
- Breathable!
- Beige w/Grey Trim
- Static-Free

For: Computers and Printers
IBM, Epson, AT&T, Leading Edge, Compaq

(800) 826-5761
In CA (415) 759-1466
Contemporary ComputerWear
1320-36th Avenue San Francisco, CA 94122

CIRCLE 805 ON READER SERVICE CARD

ACCESSORIES

CompuTogs Dust Covers

The ultimate in dust protection. Available in natural canvas/brown trim or new designer gray/black trim (add $2/cover). Our covers are far superior to vinyl!

COMPARE OUR PRICES!

MONITOR	15.95	PRINTER (specify)	15.95
KEYBOARD	13.95	MON/CPU	24.95

CompuTogs® P.O. Box 659, Chester, NJ 07930 • (201) 879-5246

VISA/MC Accepted. Include $2.50 Shipping — CUSTOM EMBROIDERY SHOWN AVAILABLE

CIRCLE 808 ON READER SERVICE CARD 1-800-227-TOGS

PRINTER RIBBONS

C ITOH Prowriter	$4.95
EPSON MX/FX/RX80	$5.00
EPSON MX/FX/RX100	$6.50
OKIDATA 92/93	$2.45
OKI DATA 182/192/193, +	$5.00

Call for complete list of products & info. Dealer inquiries welcomed.
DATEC DISTRIBUTION
P.O. Box 411
Freemont, CA 94537
415-790-6393

BAR CODING

BAR CODES MADE EASY

PERCON® E-Z-READER™

FAST • ACCURATE • RUGGED

NO SOFTWARE CHANGES with PC/XT/AT, AT&T 6300/7300 TeleVideo 905/955, Kimtron KT-7/PC, Link PCTerm, TeleVideo PCS1 & DEC VT220 keyboards. Multi-user RS 232 interfaces.

- Immediate shipment
- Free phone support
- 2-year warranty
- Bar code printing software available

Details or Questions? Call us.

(503) 344-1189

2190 W. 11th Ave. Eugene, OR 97402

A LEADER IN BAR CODE READER ENGINEERING

PERCON®

BARCODES & CHARACTERS

Software for PC, XT, AT & comp. Logmars, AIAG, Code 39, etc. for HP Laserjet, Epson, Okidata & printers w/IBM Graph. $275. Barcode inventory and comm progs. $49. Keyboard, batch file, and serial port input avail. Automatic Barcodes from elec. Scales and Cash Registers. Small Cordless portable Bk Bar Code reader 1" dia. x 7". Free info. Guarantee.
C.E. Electronics
3985 Rochester Road, Suite H
Rochester, MI 48063
(313) 656-0630

BAR CODING

BARCODE BARGAINS

NEW - WANDERWAND™ BARCODE READER

Think of everything you would ever want in a barcode reader and you'll find it in the new ITS 5308 system! Programmable • Handheld lightweight • Simple connection with standard RS 232 plug • Holds up to 48 127 characters • Discriminates between label codes, time stamp labels • Calculates and dumps scans • Wand included

ITS 5306 - PC Wand Barcode Reader

Emulates keyboard • Reads codes UPC, Codabar 3 of 9, 2 of 5 interleaved • Works with IBM PC's and clones • Lowest cost - versatile, high quality!

PCDOS-MSDOS Printing Software

Generate your own labels on your existing Matrix printer • Call for details

International Technologies & Systems Corp.
1950 White Star Dr., Diamond Bar, CA 91765
PHONE: 1-(714) 861-7977 • TELEX 6502624734 MCI

GUARANTEED LOWEST PRICES — Visa and MasterCard Accepted — ITS

CIRCLE 810 ON READER SERVICE CARD

BAR CODE READERS

NO SOFTWARE CHANGES REQUIRED PC'S:

- IBM PC/XT/AT PS/2 CLONES
- TANDY 1000SX/1200/3000/4000
- ZENITH 138/148/151/158/248
- EPSON EQUITY I & III

TERMINALS:

- WYSE 50/60/75
- KIMTRON KT-7/PC
- CONTROL DATA VIKING 721
- TANDY DT100
- RS-232

PC/MS DOS BAR CODE PRINTING SOFTWARE

RESELLER DISCOUNTS AVAILABLE

AMERICAN MICROSYSTEMS
1110 S. AIRPORT CIRCLE SUITE 140
EULESS, TX 76040 (817) 571-9015
(800) 648-4452

BAR CODING

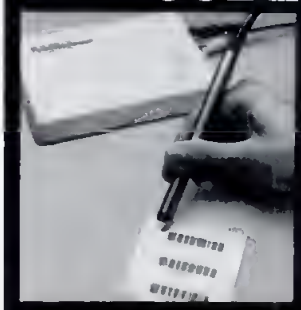
LABELING SOFTWARE

For DOT MATRIX and Laser Printers (Epson/IBM/Okidata and LaserJet)

- Flexible format
- Any size label
- Labels for bins, shelves, inventory - name tags
- Big text readable up to 50 ft.
- Bar Codes: 2 of 5, UPC/EAN, MIL-STD, AIAG, Code 39, etc.
- Auto-Incrementing
- Reversals
- Color Options
- Laser Soft Fonts
- File Input
- Very fast
- Easy

Label above printed with $279 program.
Other bar code programs from $49.

BAR CODE READERS



For PC/XT/AT & PS/2

- Attaches as 2nd Keyboard
- No software changes
- Rugged Metel Pen
- Reads 2 of 5, UPC/EAN, 128 Codabar, MSI, Code 39

PS/2 model.....$399
PC/XT/AT model.....$385
(upgradeable to PS/2.....$30)

ALSO: RS-232 Readers, Kimtron Readers & Mag. Stripe Readers

30 Day Money Back Guarantee!

WORTHINGTON DATA SOLUTIONS
417-A Ingalls Street
Santa Cruz, CA 95060

800-345-4220
In CA 408-458-9938
408/458-9938

WHY PAY MORE $7-$95

Bar Code Printing Software for PC, XT, AT, & Comp. w/printers w/Epson-IBM graphics emulation. Universal Bar Code Generator (Works with almost any program).Test disk $7. Small labels, large labels, Logmars, AIAG, dBASE, & subr. for Basic, Compilers, WP, Data Mgmt., etc. $25-$95. Bar Code readers $200-$900.
GORDON COMPANY
20210 Laceyland
Katy, Texas 77449
TEL 713-578-5522, FAX 713-579-2160

READ AND PRINT BAR CODES

Model PC-WEDGE reader interfaces with keyboard. Easy to install and use. Works with any program, no software required. Includes wand — $289 + S/H. dBARCODE prints code 39, 2 of 5, UPC on dot matrix or LaserJet from within dBASE. Easy to use, detailed manual. $99 + S/H.
Timekeeping Systems, Inc.
12434 Cedar Road
Cleveland, OH 44106
(216) 229-2579, FAX (216) 229-2573

BAR CODING

PrintBar II

BAR CODE PRINTING SOFTWARE

Print Code 39, 2 of 5, UPC-A bar codes on IBM, Epson, HP LaserJet printers with **PrintBar** II memory-resident software. Print directly from your own programs in dBASE, Lotus, WordStar, C, BASIC without copying data to special print files. IBM PC/XT/AT and compatibles. Versatile, easy set-up, no programming required. **$295.00**

PC Wand Bar Code Reader that acts like second keyboard, no software needed. **$395.00**

Bear Rock Software Co.
6069 Enterprise Drive
Placerville, CA 95667
(916) 622-4640

CIRCLE 809 ON READER SERVICE CARD

BAR CODE & MAGNETIC STRIPE READERS for the IBM PC & PS/2

Simple & quick installation
No additional software or port
Metal wand & case

Also available:
Bar code printing software
Magnetic stripe encoders
Units for other computers & terminals
GSA pricing available

TPS ELECTRONICS
4047 Transport Street
Palo Alto, CA 94303
Telephone: 415-856-6833
Telex (Graphnet) 371-9097 TPS PLA
FAX: 415-856-3843

CIRCLE 811 ON READER SERVICE CARD

BAR CODE—LABEL PRINTING

THE LABEL MAKER™ prints bar codes, OCR-A like and large characters from data entered at keyboard or from disk files. Create and save unique printing formats and record layouts. Performs record add, change, delete, sort and select on disk files. A.I. LABELMAKER™ prints AIAG shipping/parts identification labels required by Auto Mfrs. Requires IBM PC or work-alike.

TJ SOFTWARE INC
P.O. Box 2044
Arlington Heights, IL 60006
(312) 364-1065

PC Magazine Classified Marketplace
the ultimate target market!

The brand specifiers who read PC Magazine don't have the time to shop around, their only concern is getting what they need as quickly as possible.

They'll DIRECT their attention to PC Magazine Classified Marketplace

For them PC Magazine Classified Marketplace's Direct Response/Display Ad format represents a fast, easy and cost effective method of product acquisition. They know it will have the products they need and the information they want regarding price, volume discounts, specifications and delivery.

If you think that your business can benefit from the 550,000 brand specifiers who read PC Magazine YOU'RE RIGHT!

So take DIRECT action and call
(212) 503-5115

CATALOGUES

PCjr
Expansion Products

Possibly the largest selection of PCjr products in the country. We don't just sell PCjr products, we design them.

- Speed Up Products
- Pseudo DMA Cartridges
- Second Floppy Disk Drives
- 3½ Disk Drives
- PCjr Optical Mice
- Monitor Adapters for PC's
- Parallel Printer Ports
- Full Size Keyboards
- Speech Attachments
- Joysticks, Cables, & Adaptors

Call or write to receive our free 32-page catalog of PCjr Add-On products. For even faster results, circle our reader service number.

PC Enterprises
"The jrProducts Group"
Box 292, Belmar, NJ 07719
(201) 280-0025 (800) 922-PCJR

CIRCLE 812 ON READER SERVICE CARD

COMPUTER INSURANCE

SAFEWARE
INSURES YOUR COMPUTERS

Full replacement of hardware, media, purchased software. As low as $39 yearly. Covers fire, theft, power surges, other accidents. Blanket coverage, no list of equipment needed. Call for information or immediate coverage.

1-800-848-3469
Local (614) 262-0559

SAFEWARE, The Insurance Agency Inc.
2929 N. High Street, P.O. Box 02211
Columbus, OH 43202

CIRCLE 813 ON READER SERVICE CARD

INSURE YOUR COMPUTER AGAINST ACCIDENTAL BREAKAGE
1-800-822-0901

CIRCLE 814 ON READER SERVICE CARD

DATA CONVERSION

TURN APPLES TO ORANGES WITHOUT GOING BANANAS!

CALL FOR OUR FREE BROCHURE

DATA CONVERSION LABORATORY
America's Largest Data Conversion and Optical Scanning Facility
65-55 Fresh Meadow Ln, Fresh Meadows, NY 11365
(718) 886-8600

CIRCLE 772 ON READER SERVICE CARD

DATA CONVERSION

DISK TO DISK • TAPE TO DISK

WORD PROCESSORS
SPREADSHEETS
DATA BASES
MAILING LISTS
OVER 1,500 FORMATS

IBM PS/2
WORDPERFECT
LOTUS
DBASE
LANIER
WANG

(212) 463-7511

NATIONAL DATA CONVERSION INSTITUTE
5 EAST 16TH STREET, NEW YORK, NY 10003

FIRST IN DATA CONVERSION

CIRCLE 616 ON READER SERVICE CARD

DISK/TAPE/OPTICAL SCANNING

- 33¢ per page typewritten text to disk in ASCII, WP formats available on request.
- Scan Typeset text 6 to 24pt low rates
- Disk convert from IBM, WANG, XEROX, MACINTOSH + 1000 other formats (bi-directional)
- Tape conversions (800, 1600, 3200, 6250 BPI)
- Quick turnaround—Quality Guaranteed.

1st RUN COMPUTER SERVICES
1261 Broadway Suite 508
New York, NY 10001
(212) 779-0800

DISK CONVERSION

INCOMPATIBLE COMPUTERS?

Disk Interchange Service Company specializes in transferring files between 1000+ incompatible computer formats.

- **9-TRACK TAPE TO DISKETTE**
- **DEDICATED WORD PROCESSORS**
- **3.5", 5.25" & 8" FORMATS**

Additional Services Include
- Database & Spreadsheet Conversions
- Custom Programming/Data Reformatting
- Expert Technical Assistance

Disk Interchange Service Co. (DISC)
2 Park Drive, Westford MA 01886
(617) 692-8050

CIRCLE 845 ON READER SERVICE CARD

TAPE/DISK CONVERSIONS

Conversion services to or from over 1000 computer systems.
- Magtapes • Mini Computers
- Micro Computers • Typesetters
- Word Processors

CALL THE INDUSTRY LEADERS

PIVAR COMPUTER SERVICES, Inc.

(312) 459-6010
165 Arlington Heights Rd #M
Buffalo Grove, IL 60089

CIRCLE 616 ON READER SERVICE CARD

TAPE-TO-FLOPPY
FLOPPY-TO-TAPE
TAPE DUPLICATION
FLOPPY-TO-MICROFICHE
LASER PRINTING

1-800-422-9622
(In OK: 918 254 9622)

TECHNICAL PROGRAMMING SERVICES, INC.
8506 EAST 61ST STREET
TULSA, OK 74133-1301

CIRCLE 819 ON READER SERVICE CARD

CHANGING WORD PROCESSORS?

Media transfer to or from IBM, XEROX, DEC, WANG, LANIER, CPT, CT, MICOM, NBI, WORDSTAR, WORDPERFECT, MS/WRD, DW3, MULTIMATE, SAMNA, MASII, DCA.

*******FREE TEST CONVERSION******

Conversion Specialists
531 Main St., Suite 835
El Segundo, CA 92045
(213) 545-6551 • (213) 322-6319

PC MAGAZINE MARKETPLACE

DISK CONVERSION

Computer Compatibility. All It Takes Is The Missing Link.™

Shaffstall 6000
Make all data compatible data with this innovative disk-to-disk conversion system. It's quick. Easy. And economical.

- Over 14,000 disk-to-disk conversion programs available
- Access 8", 5¼" and 3½" formats
- Fast—converts a disk in less than 15 minutes
- Works with any IBM XT, AT, or compatible PC
- Systems start as low as $6,000

Call 1-800-248-DISK for a Free Demonstration.
317-842-2077
Indianapolis, Indiana, U.S.A.

SHAFFSTALL CORPORATION
The Leader in Digital Conversion Systems

The Missing Link is a registered trademark of the Shaffstall Corporation

CIRCLE 817 ON READER SERVICE CARD

DISKETTE COPY SERVICE

We're the Leader in Software Duplication

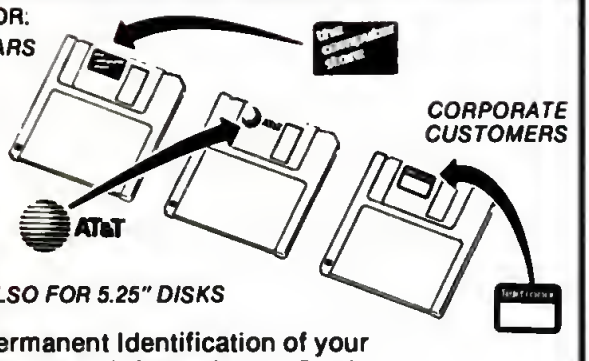
Fortune 500 companies and software publishers choose Echo Data for 24 Hour turn-around, high quality, and competitive prices! All IBM formats are supported. Custom labels, sleeves, full packaging. We have the best state-of-the-art copy protection in the nation! Why even think about anyone else?

ECHO

Echo Data Services, Inc.
Lionville, PA 19353
800-533-4188 or
215-363-2400 in PA

DISKETTE COPY SERVICE

"NEW" PRINTED 3.5" SHUTTERS



Permanent Identification of your Company, Information, or Products.

PC MAGAZINE

"My Favorite guys are the boys at Portland-based West Coast Telecom." "They'll do just about anything and do it inexpensively."

— John C. Dvorak, PC Magazine

WEST COAST TELECOM
CALL: (503) 620-1888
CIRCLE 822 ON READER SERVICE CARD

SOFTWARE DUPLICATION/PACKAGING

SOFTWARE DUPLICATION

- One Stop Shopping
- Custom Packaging
- Copy Protection
- Technical Support
- Drop Shipping
- Fast Turn-Around
- Competitive Pricing

SATISFACTION GUARANTEED
800-222-0490
NJ 201-462-7628

MEGASoft
P.O. Box 710
Freehold, NJ 07728
CIRCLE 821 ON READER SERVICE CARD

NETWORKING

KEYCARD ELIMINATOR™

NOVELL ADVANCED NETWARE® 2.0a & 2.1
KEYCARD FAILURE?
NEED TRUE SFT?
SLOTBOUND?
FAST CPU?

$99.00

NBS
NETWORK BUSINESS SYSTEMS

CIRCLE 825 ON READER SERVICE CARD

MAILING LISTS

FREE CATALOG
Over 2 million names on 75 owner/user lists. IBM, Apple, mini sites, resellers, stores, VAR's, chains, mail order dealers, educational, Unix, Pascal, Cobol, Lotus, dBase, modem, investor, publications, clubs. Call/Write for free catalog. Note: We do not sell hardware or software.
TARGETED MARKETING INC. - Irv Brechner
Box 5125-P
Ridgewood, NJ 07451
In N.J., 201-445-7196

PUBLICATIONS

•••••••• PCjr LOVERS! ••••••••
A 32 page monthly mini-magazine just for you! Each issue is devoted to "How to's" for increasing PCjr compatibility, Q&A, PCjr hardware and software reviews, and much more. Call or write today for a FREE SAMPLE. $19.97/yr. for 12 exciting issues (Canada $25.97, U.S. money order).
The Junior Report
P.O. Box 59067, Dept. P
Schaumburg, IL 60159-0067
312-310-9033

DUPLICATION FROM 59¢
Affordable rates only 59¢ for 5.25" & $1.59 for 3.50" MS/DOS Duplication. Price includes:
*Quality Brown Disc Media
*Duplication with 100% verification
*Label Application
*Quick Turnaround & Guaranteed Products
Rates go even lower as you continue to order!
DIVERSIFIED SYSTEMS GROUP, INC.
P.O. Box 1114
Issaquah, WA 98027
800/255-3142 206/392-0900

PC MAGAZINE MARKETPLACE
the ultimate target market!

The brand spenders who read PC Magazine don't have the time to shop around. their only concern is getting what they need as quickly as possible.

They'll DIRECT their attention to PC Magazine Classified Marketplace

For them PC Magazine Classified Marketplace's Direct Response/Display Ad format represents a fast, easy and cost effective method of product acquisition. They know it will have the products they need and the information they want regarding price, volume discounts, specifications and delivery.

If you think that your business can benefit from the 320,000 brand spenders who read PC Magazine ... YOU'RE RIGHT!

So take DIRECT action and call (212) 503-5115

SUPPLIES

SOFTWARE PACKAGING To Meet Your Needs

Glenco Development Systems offers several choices to help you with your software packaging. Our product line includes cloth and vinyl binders/portfolios for your users manual and program diskette. The binders can be screened with your company logo to add that extra personal touch. The final product is an organized, eye-catching presentation that your efforts deserve.

In addition to packaging, **Glenco Development Systems** offers a wide variety of services, including finished product assembly, to help get your software products to market. Typesetting of manuals can be as easy as sending an ASCII file. Duplication and label affixing as well as product assembly/shrink wrap are readily available. Please consult us with your specific needs.

GDS

721 West Algonquin Rd
Arlington Hts., Il 60005
(312) 364-SOFT
Telex 493-7109, FAX 364-7698

RIBBONS

24 Hour Shipping

1-800-331-6841

1-513-252-1247 (Ohio)

Over 350 types

** Satisfaction Guaranteed **

	BLACK	COLORS
APPLE IMAGEWRITER	2 95	3 45
DIABLO HT II M/S	2 95	
EPSON LX-80/90	3 50	4 30
EPSON MX-FX 80	2 95	3 65
EPSON MX-FX 100	3 95	4 95
IBM PROPRINTER	4 50	
NEC P1 2, 6	5 30	
NEC P3, 7	6 40	
OKIDATA 82-92	1 25	1 45
OKIDATA 182-192	4 50	5 75
PANASONIC KXP	4 50	5 75

DAYTON COMPUTER SUPPLY
a division of Dan Sys Corp
1220 Wayne Avenue, Dayton Ohio 45410
EST 1979 TERMS MC VISA C O D

CIRCLE 828 ON READER SERVICE CARD

FOR CRISP, BLACK PROFESSIONAL PRINT CHOOSE FROM 3 MODELS STARTING AT $39.95

RE-INK FABRIC RIBBONS!

CALL TOLL FREE 800-553-2404

BORG INDUSTRIES
JANESVILLE,
IOWA 50647

CIRCLE 806 ON READER SERVICE CARD

TO PLACE YOUR AD IN PC Magazine Classified Marketplace
Call (212) 503-5115

New 3M

5¼" MARK Q DISKETTES

Tested to 30 million passes with no media deterioration

SSDD	$ .69 ea
DSDD	.77 ea
DSHD	1.54 ea

Minimum Qty 50 Disks

Performance Through Quality

3M DATA CARTRIDGES

Minimum 5 Cartridges
S&H $3.00/5 Data Cartridges

DC1000	$13.25 ea
DC2000	17.95 ea
DC300XL/P	19.65 ea
DC600A	22.35 ea
DC600XTD	23.65 ea

Precision Data Products™

ORDER NOW! Call for FREE Catalog

CIRCLE 824 ON READER SERVICE CARD

LASER CARTRIDGE RECHARGE

Cut your cost in half with recharged Laser printer cartridges.

Exclusive toner with blackest print and top quality.
Cartridges last 20% longer
Money back guarantee
27 different Laser Printer engines to recharge
Send empty cartridge with $40 + $3 s/h.
Monthly discounts. Toner available

LASER SYSTEMS/
TONER TECHNOLOGIES
23 NO. MAIN / P.O. BOX 407
KAYSVILLE, UT. 84037
(801) 544-3090

CIRCLE 827 ON READER SERVICE CARD

$SELL US YOUR EMPTY TONER CARTRIDGES $10

SHOT OUR REFILLED CARTRIDGES

CIRCLE 826 ON READER SERVICE CARD

TRAINING/ TUTORIALS

SOFTWARE VIDEO TRAINING

- All popular PC training courses available Lotus, WP, DBase, DOS, PC's etc
- Information packed videos - Using traditional and professional teaching methods
- Great for repetitive training anytime anywhere
- Beginner and advanced classes each 2 hrs. in length

Beta - VHS Versions

MICRO PLUS TECHNOLOGIES INC

$79.95 per course

Extension 857

1-800-628-2828

INSTANT REPLAY III

Builds Demos, Tutorials, Prototypes, Music Presentations, Time Keyboard Macros, & Menu Systems. Includes Screen Maker, Keystroke & Time Editor, Program Memorizer, & Animator. Received Great Reviews! Simply The Best! 60-day satisfaction money back guarantee. Demo Disks Avail. IBM & Compatibles $149.95
Nostradamus Inc.
3191 South Valley St. (Suite 252)
Salt Lake City, UT 84109
(801) 487-9662

TYPESETTING

HIGH-TECH TYPESETTING

Transmit your text toll-free, error-free via modem to your fully automated typesetting system. $2 per thousand characters. $5 minimum. Same-day service. 200-typefaces, sizes up to 72 point. Send $20ppd. for our 200 page guidebook, or call toll-free & use your MC/VISA/AmEx.
Intergraphics
106A South Columbus St.
Alexandria, VA 22314
(800) 368-3342 or (703) 683-9414 in DC area

PC Magazine Classified Marketplace the ultimate target market!

The brand specifiers who read PC Magazine don't have the time to shop around. their only concern is getting what they need as quickly as possible.

They'll DIRECT their attention to PC Magazine Classified Marketplace

For them PC Magazine Classified Marketplace's Direct Response/Display Ad format represents a fast, easy and cost effective method of product acquisition. They know it will have the products they need and the information they want regarding price, volume discounts, specifications and delivery.

If you think that your business can benefit from the 550,000 brand specifiers who read PC Magazine . . . YOU'RE RIGHT!

So take DIRECT action and call (212) 503-5115

EDITORIAL PRODUCT INDEX

READER SERVICE NUMBER	PRODUCT	COMPANY	PAGE
ADD-IN BOARDS			
430	CuRAM 80-8	Cumulus Corp.	43
697	Designer VGA	Orchid Technology	98
699	Everex EVGA	Everex Systems Inc.	94
661	IBM 8514/A Display Adapter	IBM Corp.	116
660	IBM 8514 Color Display	IBM Corp.	116
659	IBM 8514 Memory Expansion Kit	IBM Corp.	116
698	Intelligent VGA Board	Intelligent Data Systems Inc.	98
696	Paradise VGA Plus Card	Paradise Systems Inc.	100
695	Sigma VGA/H	Sigma Designs Inc.	107
694	Tatung VGA Platinum Card	Tatung Co. of America Inc.	111
692	Tecmar VGA	Tecmar Inc.	116
693	Ultra-Grafix VGA Model 580 Card	Taxan USA Corp.	111
691	VEGA VGA	Video Seven Inc.	120
AFTER HOURS			
649	Campaign Promises	Front Runner Software	524
645	Bob and Jean Anderson's Computer Stretches	FB Systems Inc.	521
648	Family Reunion	FAMware	522
647	Family Roots	Quinsept Inc.	520
646	Roots II	Commsoft	520
COMMUNICATIONS			
690	Ascom IV	Dynamic Microprocessor Associates	128
689	BitCom	BIT Software Inc.	132
680	Boyan	Boyan Communications	135
679	Crosstalk Mk.4	Digital Communications Associates Inc.	138
678	Crosstalk XVI	Digital Communications Associates Inc.	142
688	Freeway Advanced	Kortek Inc.	147
677	HyperAccess	Hilgreave Inc.	148
687	Lync	Norton-Lambert Corp.	154
686	MEX-PC	NightOwl Software Inc.	156
675	Mirror II	SoftKlone Distributing Corp.	158
674	ProComm	Datastorm Technologies Inc.	160
673	ProComm Plus	Datastorm Technologies Inc.	160
686	Professional-YAM	Omen Technology	167
672	Ptel	Phoenix Technologies Ltd.	172
685	Qmodem	The Forbin Project	176
684	Relay Gold	Vm Personal Computing	179
683	684	Vm Personal Computing	179
671	Respond/Async	Software Synergy Inc.	187
682	SideTalk	Lattice Inc.	190
681	Smartcom III	Hayes Microcomputer Products Inc.	192
670	Softerm	Softronics Inc.	196
COMPUTERS			
438	ALR FlexCache 25386	Advanced Logic Research Inc.	51
683	Amdek System 286A	Amdek Corp.	209
682	Arche Rival 286	Arche Technologies	216
681	Core ATomizer	Core International	224
680	Dataworld Data 286	Dataworld	226
679	Epson Equity II Plus	Epson America Inc.	224
437	Everex Step 386/25	Everex Computer Systems Divsion	51
678	Hyundai Super-286C	Hyundai Electronics America	232
677	Kaypro 286	Kaypro Corp.	235
441	MicroDirect Complete Portable Office	MicroDirect Inc.	51
676	Mitac Paragon 286F	American Mitac Corp.	214
436	Mitsubishi MP286L	Mitsubishi Electronics America	52
447	Northgate Power 386	Northgate Computer Systems	54
443	PC Office NT-10	PC Office	52
675	Star Industries AT 286	Star Industries	244
445	Toshiba T5100	Toshiba America Inc.	33
DATABASE MANAGEMENT			
450	Emerald Bay	Migent Inc.	36
DESKTOP PUBLISHING			
433	Super Cartridge I	IQ Engineering	38
GRAPHICS			
448	Draw Applause, Version 1.0	Ashton-Tate	48
SCANNING			
444	GEM Scan	Digital Research	46
440	Mitsubishi MH 216	Mitsubishi Electronics America	51
439	ScanMan	Logitech Inc.	51
SOFTWARE			
446	IZE	Persoft Inc.	33
TUTORIALS			
431	Dan Bricklin's Demo II Program	Software Garden Inc.	43
449	Taming MS-DOS, 2nd edition	M&T Books	38
UTILITIES			
432	SolveIT, Version 3.3	Structured Scientific Software	46
435	The Image Printing Utilities	Image Computer Systems	56
434	Tree86, Version 2.0	The Aldridge Co.	56
WORD PROCESSING			
643	Alexander	Design Enterprises of San Francisco	117
642	ChiWriter	Horstmann Software Design Corp.	71
641	The Egg	The Peregrine Falcon Co.	129
640	EXP	Wadsworth & Brooks/Cole Advanced Books & Software	129
631	Lotus Manuscript	Lotus Development Corp.	131
639	PCTeX	Personal TeX Inc.	130
638	PS	Scroll Systems Inc.	138
637	Spellbinder Scientific	Spellbinder Software Products Inc.	304
632	T3	TCI Software Research Inc.	308
636	Tech/Word	Goldstein Software Inc.	312
635	TechWriter	CMI Software	316
634	Total Word	Lifetree Software Inc.	318
633	WordMarc Composer	Marc Software International Inc.	324

PRODUCTIVITY

DEPARTMENT	PROGRAM NAME/DESCRIPTION	PAGE
PC Lab Notes	QFRESH postpones the refresh cycle of DRAM chips to boost speed.	331
Utilities	SETMODE helps set up your video mode and communications parameters.	351
Environments	BOXES1.C uses the OS/2 1.1 Presentation Manager's graphical interface.	579
Power Programming	QFN stores incomplete filenames in fully qualified drive-and-path form.	397
Spreadsheet Clinic	Macro enters a series of month-spaced dates into a 1-2-3 column.	413
Spreadsheet Clinic	Instantly editing 1-2-3 and Symphony cells that /Data Query Find locates.	414
Spreadsheet Clinic	Macro uses a subroutine call to return to saved addresses of 1-2-3 cells.	414
Spreadsheet Clinic	Formula calculates grand total of a multiple-section 1-2-3 worksheet.	416
User-to-User	INTENSE.COM forces CGA to use its brighter color palette as the default.	419
User-to-User	Danger of overwriting files when using DOS's APPEND command with BASICA.	419
User-to-User	Batch files that help you quickly develop MASM and IBM COBOL/2 programs.	420
Power User	Speeding up WordPerfect by copying it to a RAMdisk.	427
Power User	WordPerfect macros create a concordance file of words and phrases.	427
Power User	WordStar's spell checker, and Microsoft Word thesaurus as spell checker.	428
Power User	Finding current drive and directory in dBASE, DBXL, Quicksilver, FoxBase.	428
Power User	Clipper routines to determine the current drive and subdirectory.	431
Languages	Making and downloading custom fonts to Epson or IBM dot matrix printers.	435
Languages	MERGE.C merges C source code with Turbo C compiler's assembler output.	436
Languages	Turbo Pascal Coprocessor Clock program creates a real-time clock display.	440
PC Tutor	How sectors are marked as bad on IBM PS/2 Model 50 hard disks.	447
PC Tutor	Relation of 80xx parity flag setting to bits in a data operation result.	448
PC Tutor	Simultaneously displaying mono and color on two-monitor IBM PC systems.	448
PC Tutor	Patching PC Magazine REMOVE.COM utility to eliminate Press ENTER prompt.	450
Connectivity Clinic	Stop print spool in 1-2-3 and WordPerfect (with 3+Share), and DataFlex.	453
Connectivity Clinic	ENADR.C extracts Ethernet network address for 3Com 3C501 EtherLink card.	453
Connectivity Clinic	Finding a station address on an ARCnet network running Novell's NetWare.	454

PC MAGAZINE ADVERTISERS PRODUCT INDEX

RS#	ADVERTISER	PRODUCT	PAGE#
GENEALOGY SOFTWARE			
	GeneaLogic Systems	Lineage Master	
ACCOUNTING SOFTWARE			
185	Aptech Inc	Abraxas	293
482	Bedford Software Limited	Accounting Software	320
261	Computer Associates	Super Project Plus	401
194	Cougar Mt Software	Accounting Software	371
220	DAC Software	Accounting Software	69
200	Integrated Information Service	Accounting Software	21
263	Macola Inc	Accounting Software	442
358	Peachtree Software	Accounting Software	330
470	SBT Corp	Database Accounting	18-19
DESK TOP ORGANIZERS			
137	Borland International	Sidekick Plus	55
*	Lotus	Metro	149
*	Micro Logic Corp	Tornado	347
384	Qandu Computing, Inc	Rollcall	250
DATABASE MANAGERS			
519	Ashton Tate	Rapid File	376-377
471	askSam System	Free Form Database	86
377	Borland International	Paradox	57
494	Buttonware	PC File	326
327	Revelation Technologies, Inc	Advanced Revelation	412
148	dbFast	dbFast	307
112	Fox Software Inc	Mac Database	87
176	Microrim	Rbase	424-425
*	Oracle	Database Management Software	47
145	PC Sig	Shareware	463
348	Research Development Systems	Letter Master	350
745	Symantec	Q & A 3 0	45
529	The Public (Software) Library	S/W By the Public S/W Library	392
508	Wordperfect Corporation	Dataperfect	395
FILE SYSTEMS & ACCESS METHODS			
502	Group L Corporation	Memory Lane	326
302	Micro Com Systems	Multifunction & Pub Domain S/W	16
526	Microlytics	Gofer	185
145	PC Sig	Shareware	463
529	Tha Public (Software) Library	File Systems & Access Methods	392
FINANCIAL PLANNING SOFTWARE			
*	Intuit Software	Quicken	231
145	PC Sig	Shareware	463
INFORMATION MANAGERS			
*	Lotus	Agenda	119-121
302	MicroCom Systems	Multifunction & Pub Domain S/W	16
*	MicroLogic Corp	Tornado	347
INTEGRATED SOFTWARE			
130	Computer Ease Software	Word Mover	316
*	Informix Software Inc	Smart Ware	180-183
*	Lotus	Symphony	247
263	Software Group, The	Enable	186
LANGUAGES			
360	Crescent Software	Basic Programming Tools	443
*	Microsoft	Quick C	C8
*	Microsoft	Quick Basic	327
331	Microway	Fortran Compiler	334
OPERATING SYSTEMS/ENVIRONMENTS			
474	Quarterdeck	Desqview	99
245	Santa Cruz Operation, Inc	SCO XFNIX 386	366
*	Softlogic Solutions	Software Carousel	168
*	Softlogic Solutions	Double Dos	168
393	Software Link, Inc	PC MOS/386	212-213
PROGRAM DEVELOPERS/GENERATORS			
134	Clarion Software	Clarion	70
360	Crescent Software	Basic Programming Tools	443
PROJECT MANAGEMENT			
249	Symantec/Breakthrough	Timeline 2 0	42
STATISTICAL SOFTWARE			
154	Math Soft Inc	Math Cad	305
TEXT EDITORS			
188	Command Technology Corp	SPF/PC	428
UTILITIES			
137	Borland International	Sidekick Plus	55
120/160	Central Point Software	PC Tools Deluxe, Option Board	74-75
134	Clarion Software	Clarion	70
360	Crescent Software	Basic Programming Tools	443
148	dBFast	dBFast	307
323	Funk Software	Sideways, Noteworthy, Inword	82-83
369	Golden Bow Systems	V-Opt	4
502	Group L Corporation	Memory Lane	326
380	Hammerly Computer Services, In	Pro Bas	335
302	Micro Com Systems	Multifunction & Pub Domain S/W	16
*	Micro Logic Corp	Tornado	347
211	Paul Mace Software	Paul Mace Utilities	309
489	Personal Computer Support	Breakthru	10
282	Personics Corp	See More	17
*	Personics Corp	See More...	406
384	Qandu Computing, Inc	Rollcall	250
*	Quaid Software Ltd	Utilities	304
290	Rose Electronics	Passport	308
334	Softlogic Solutions	Disk Optimizer	39
*	Softlogic Solutions	Software Carousel	168
*	Softlogic Solutions	Magic Mirror	188
*	Softlogic Solutions	Cubit	168
*	Softlogic Solutions	Desk Optimizer	168
*	Softlogic Solutions	Double Dos	168
726	Software Excitement	Shareware Software Products	318
319	Sterling Castle	Forget Me Not Software	341
*	Transecsystems, Inc	Unlock Master Key/Game Master	437
222	Traveling Software	Laplink	325
312	White Crane Systems	Brooklyn Bridge	28
WORD PROCESSING SOFTWARE/AIDS			
218	Bitstream	Fonts	257
130	Computer Ease Software	Word Mover	316
292	Corporate Software	Upgrade Program	319
502	Group L Corporation	Memory Lane	326
302	MicroCom Systems	Multifunction & Pub Domain S/W	16
240	Micropro International	Wordstar	358-359
479	Rightsoft Inc	Right Writer	37
*	Software Publishing	Professional Write	264-265
250	Symantec	Q & A Write	58
518	Xyquest	Word Processing Software	134
CAD/CAM			
475	American Small Business Comp	Cad Software	353
165	Autodesk	Autosketch	313
508	Generic Software Inc	Generic Cadd	378
SPREADSHEET/TEMPLATES			
323	Funk Software	Sideways, Noteworthy, Inword	82-83
*	Microsoft	Excel	C5-7
145	PC Sig	Shareware	463
483	Personal Computer Support Group	Lucid	12-13
282	Personics Corp	See More	17
*	Personics Corp	See More	406
*	Softlogic Solutions	Cubit	168
234	Software Spectrum	Lotus	391
529	The Public (Software) Library	Spreadsheet/Templates	392
DESK TOP PUBLISHING			
128	Aldus Corp	Pagemaker	198-201
218	Bitstream	Fonts	257
499	IMSI	Page Perfect	29
*	Softlogic Solutions	Magic Mirror	168
299	Swfte International Ltd	Glyphix	109
259	The Laser Connection	Jetscript	5
DATA ENTRY SOFTWARE			
174	Form Worx Inc	Form Worx	101
VERTICAL MARKET SOFTWARE			
149	Bible Research Systems	The Word Processor	481
COMPATIBLE KEYBOARDS			
723	Zeos International	Compatible	79
721	Zeos International	Compatible	234
BACKUP SOFTWARE			
485	Westlaka Data Corp	Backup Software	312
DISK BACKUP & TAPE DRIVES			
527	Archive	Back Up	314
261	Compact Disc Products	CD-ROM	308
378	Iomega Corporation	Removable Hard Disk Drives	360
219	Irwin Magnetics	Tape Back Up	248-249
193	Kinson Products	Floppy disk	124
495	Maynard Electronics	Tape Back Up	430
173	Sysgen Inc	5¼" Bridge-File Floppy Disk	218
233	Tallgrass Technologies	Disk Back Up	306
HARD DISKS			
341	Lifetime Memory Products	Hard Disk Drives	457
164	Plus Development	Hardcard Micro Manager	294-295
271	Sony Corp	Cd ROM	193
232	Tandon Corp	Datapac	362-363
COMPUTERS/COMPATIBLES			
111	Arche Technologies	Arche Rival 286	206
296	B S I	PC	420
275	Bentley Computers	Compatibles	410-411
481	Bulldog Computer Products	Computer/Accessories	432-433
320	Compu Add Corp	Compatibles	161
163	Computer Products United	PC	174-175
225	Core International	Atomizer	261
*	Dataworld	PC	426
257	Entre Computer Centers	Computer Centers	217
216	Everex Systems Inc	Desktop Computers	274-275
386	Five Star Electronics, Inc	PC Compatibles	458-459
740	GE Computer Service	Computer	417
357	Hewlett Packard-Vectra	Vectra PC	104-105
124	Hyundai	PC Compatible	454
*	IBM Corp	ASC Terminals	396
496	Insignia Solutions	Soft PC	407
382	Intelligent Microsystems	Clone Computers	444-445
343	Kaypro	286 Computer	333
102	May Computers	PC	197
*	Northgate Computer Systems	286 At Machine	404-405
310/311	PC Brand	Clona & Software	22-23
372	PC Designs	Compatible	421
336	Dell Computer	PC Compatibles	114-115
539	Dell Computer	PC Compatibles	112-113
298	Samsung	AT/XT Compatibles	446
390	Spield Computer Systems	386 & 286	50
254	Sun Microsystems	Sun 386J	170-171
*	Toshiba	Laptops	236-237
329	Vertex Systems	PC	233
734	WYSE Technology	Modular Systems Architecture	229
INPUT DEVICES			
133	Logitech	Mouse	188-189
182	Logitech	Mouse	215
350	Mouse Systems	PC Mouse	297
*	Northgate Computer Systems	Keyboard	452

READER SERVICE CARD

FREE INFORMATION

IT'S AS EASY AS 1, 2, 3

1 Fill in your name and address and check off your answers to the eight research questions. (One card per person, please.)

2 Circle the numbers on the card that correspond to the ads or articles you'd like more information about. (Numbers for advertised products are repeated in the Advertiser Index as well.)

3 The literature will be mailed to you from the advertiser free of charge.

CIRCLE FOR FREE INFORMATION

Void after October 31 1988

101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150
151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200
201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250
251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300
301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350
351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400
401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450
451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500
501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550
551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600
601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650
651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700
701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750
751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800
801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850
851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900

1. In which of the following sectors does your organization operate? (Check one.)
- a. ☐ Private Industry
- b. ☐ Government
- c. ☐ Education

2. Your primary job function is (check one):
- d. ☐ MIS/DP, Communications Systems, Programming
- e. ☐ Engineering/R&D
- f. ☐ Finance/Accounting
- g. ☐ Marketing/Sales
- h. ☐ Administrative/General Management

3. Is your company a reseller?
- i. ☐ Yes
- j. ☐ No

4. For how many IBM PC's and compatibles do you specify brands of products?
- k. ☐ 10 or less
- l. ☐ 11-25
- m. ☐ 26-100
- n. ☐ 100 or more

5. Are any PC's in your office?
- o. ☐ Linked to mainframe
- p. ☐ Linked to mini
- q. ☐ Networked together

6. Does your company own
- r. ☐ Mainframe(s)
- s. ☐ Mini(s)

7. Do you plan to to buy
- t. ☐ Now
- u. ☐ In 4 to 6 months
- v. ☐ In 6 to 12 months
- w. ☐ No definite plans

8. Number of employees in your entire company?
- x. ☐ 25 or less
- y. ☐ 26-99
- z. ☐ 100-499
- 1. ☐ 500-999
- 2. ☐ 1000 or more

PC 7/88 2

PLEASE PRINT CLEARLY—use only one card per person

Name_____

Business Phone (_____)_____

Company_____

Address_____ Apt.____

City_____

State_____ Zip_____
(Zip code must be included to insure delivery)

☐ **Please send me one year (22 issues) of PC Magazine for $31.97. I'll save 51% off the annual newsstand price of $64.90. (Annual basic subscription price is $44.97.) Offer valid in U.S. and possessions only.**

CIRCLE FOR FREE INFORMATION

Void after October 31 1988

101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150
151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200
201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250
251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300
301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350
351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400
401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450
451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500
501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550
551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600
601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650
651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700
701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750
751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800
801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850
851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900

1. In which of the following sectors does your organization operate? (Check one.)
a. ☐ Private Industry
b. ☐ Government
c. ☐ Education

2. Your primary job function is (check one):
d. ☐ MIS/DP, Communications Systems, Programming
e. ☐ Engineering/R&D
f. ☐ Finance/Accounting
g. ☐ Marketing/Sales
h. ☐ Administrative/General Management

3. Is your company a reseller?
i. ☐ Yes
j. ☐ No

4. For how many IBM PC's and compatibles do you specify brands of products?
k. ☐ 10 or less
l. ☐ 11-25
m. ☐ 26-100
n. ☐ 100 or more

5. Are any PC's in your office?
o. ☐ Linked to mainframe
p. ☐ Linked to mini
q. ☐ Networked together

6. Does your company own
r. ☐ Mainframe(s)
s. ☐ Mini(s)

7. Do you plan to to buy
t. ☐ Now
u. ☐ In 4 to 6 months
v. ☐ In 6 to 12 months
w. ☐ No definite plans

8. Number of employees in your entire company?
x. ☐ 25 or less
y. ☐ 26-99
z. ☐ 100-499
1. ☐ 500-999
2. ☐ 1000 or more

PC 7/88-1

PLEASE PRINT CLEARLY—use only one card per person

Name_____

Business Phone (_____)_____

Company_____

Address_____ Apt.____

City_____

State_____ Zip_____
(Zip code must be included to insure delivery)

☐ Please send me one year (22 issues) of PC Magazine for $31.97. I'll save 51% off the annual newsstand price of $64.90. (Annual basic subscription price is $44.97.) Offer valid in U.S. and possessions only.

HOW TO STAY ON TOP OF WHAT'S IN THE PC MARKET

USE THIS CARD TO OBTAIN FREE INFORMATION ABOUT PRODUCTS AND SERVICES IN THIS ISSUE (SEE OTHER SIDE)

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 33854 PHILADELPHIA, PA

POSTAGE WILL BE PAID BY ADDRESSEE

PC MAGAZINE

P.O. Box 40049
Philadelphia, PA 19106-9931

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 33854 PHILADELPHIA, PA

POSTAGE WILL BE PAID BY ADDRESSEE

PC MAGAZINE

P.O. Box 40049
Philadelphia, PA 19106-9931

RS#	ADVERTISER	PRODUCT	PAGE#
PROGRAMMERS TOGLS UTILITIES			
116	Blaise Computing	Blaise Compiler	392
360	Crescent Software	Basic Programming Tools	443
148	dBFast	dBFast	307
380	Hammerly Computer Services In	Pro Bas	335
487	Software Masters	The Visible Computer	304
488	Software Masters	Programming Tools	317
ADD-ON BOARDS			
345	Alloy Computer Products	PC Plus	202
166	AST Research	VGA Board	415
540	ATI Technologies Inc	VGA Board	281
120/160	Central Point Software	Copy II PC Deluxe Option Board	74-75
159	Everex Systems Inc	EGA Boards	184
265	IDE Associates	PS/2 Boards	136-137
252	Sigma Designs	VGA Boards	441
513	Wordperfect Corporation	Add In Board	348-349
SCANNERS/DIGITIZERS			
316	Chinon	Scanner	191
247	Data Copy	Scanner	245
PRINTERS			
242	Alps America	Printer	282-283
328	Buffalo Products	SX Peripheral Sharing Device	429
114	Citizen America Printer	Printers	2-3
152	Data Technology Corp	Crystal Print	255
241	Diconix	Printer	270-271
339	Hewlett Packard	Deskjet	388
224	Mannesman Tally	Laser Printers	194
235	Okidata	Printer	311
129	Output Technology	OTC 850XL	322
119	Panasonic Computer Division	Laser Printers	387
749	Ricoh of America	Laser Printers	211
259	The Laser Connection	Jetscript	5
*	Toshiba	Printers	385
PRINTER RIBBONS			
344	National Computer Ribbons	Computer Ribbons	473
PRINTER ACCESSORIES			
172	Bay Technical Associates	Print Master II	178
290	Rose Electronics	Porter/Masterswitch	308
PORTABLE/LAP COMPUTERS			
313	Datavue	Spark	399
371	Mitsubishi Electronics	Laptop	364-365
*	Toshiba	Laptops	236-237
PC FAX			
189	Quadram Corp	JT Fax	359
DISPLAYS/MONITORS/TERMINALS			
101	Magnavox	Monitor	110
131	NEC Home Electronics Inc	Multisync	122-123
115	NEC Home Electronics Inc	Monitor	240-241
209	Princeton Graphics	OTP Monitors	126
271	SONY Corp	Monitors	193
337	Zenith Data Systems	Monitors	155
GRAPHICS SOFTWARE			
324	Ashton Tate	Draw Applause	334-335
174	Form Worx Inc	Form Worx	101
201	Haventree Software	Flow Charts	438
*	Lotus	Freelance Plus	225
*	Lotus	Freelance Plus	227
*	Lotus	Graphwriter	157
*	Lotus	Graphwriter	159
*	Micrografx	Graphics S/W-Windows Pres Mgr	92
325	Zenographics	Graphics	9
PLOTTERS/CHARTING DEVICES			
373	Mutoh America Inc	Plotters	285
VIDEO GRAPHICS/BOARDS			
166	AST Research	VGA Board	415
239	Genoa Systems Corp	VGA Board	382
359	Paradise Systems	VGA Boards	125
150	Truevision Inc.	VGA Board	173
127	Video-7	VGA Board	393
513	Wordperfect Corporation	Graphics Video Display	348-349
ACCELERATOR BOARDS			
276	Hauppauge	386 Motherboard	32
489	Personal Computer Support	Breakthru	10
COMMUNICATIONS SOFTWARE			
130	Computer Ease Software	Word Mover	316
504	Data Storm Technologies Inc	Communications Software	139
330	Dynamic Microprocessor Assoc	Chairman	389
170	Equinox Systems Inc	Switchlan	456
136	Hayes Microcomputer Products	Communications Software	372
228	Meridian Technology	CC Express	133
217	Norton-Lambert	Close-up	20
722	PCC Systems	CC Mail	324
290	Rose Electronics	Passport	308
476	Softklone	Mirror II	326
222	Traveling Software	Laplink	325
256	Relay Communications	Relay Gold	144-146
312	White Crane Systems	Brooklyn Bridge	28
LOCAL AREA NETWORKING			
230	A S P Computer Products	Simplan	406
345	Alloy Computer Products	PC Plus	202
140	American Power Conversion Corp	UPS	368
395	Axon	LAN	329
328	Buffalo Products	SX Peripheral Sharing Device	429
328	DCA/Crosstalk Communications	MARK IV	152-153
278	DCA	Mark IV	76
532	DCA/FOX	10 NET	262-263
525	Excell Tech	LAN	448
148	Gateway Communications	LAN Gateway	423
374	Micronet	Micronet	422
147	Nethne	Many Link	455
103	Novell Inc.	SFT Netware V2 1	298-299
722	PCC Systems	CC Mail	324
290	Rose Electronics	Masterswitch	308
191	TOPS	Connectivity	60-61
MICRO-MAINFRAME LINKS			
531	DCA FOX	IRMA Remote	262-263
532	DCA/FOX	10 NET	286-287
146	Gateway Communications	LAN Gateway	423
MODEMS			
507	Natural Microsystems	Watson	450
231	Touchbase Systems	Modem	310
364	Ven-Tel	Modems	14
EMULATORS/PROTOCOL CONVERTORS			
366	Persoft	Term. Emulator Software	243
365	Persoft	IZE-Term, Emulator Software	84
DISKETTES			
267	3M Data Recording Products Div	Magnetic Media	356-357
169	KAO Corporation	Disks	288
INSURANCE			
728	Safeware	Insurance	422
POWER PROTECTION			
140	American Power Conversion Corp	UPS	368
383	Cuesta Systems Corp	Datasaver	323
167	Kensington Microware Ltd	Master Piece Master Piece Plus	203
381	Para Systems Inc	Minuteman	72
473	PC Cooling Systems	Power Supplies	177
739	Safe Power Systems	Power Supply	348
PC ACCESSORIES			
204	Avery	PC Accessories	416
518	Computer Accessories	PC Accessories	88-89
*	Curtis Manufacturing	PC Accessories	336-338
257	Entre Computer Centers	Computer Centers	217
269	International Battery Corp	Replacement Battery	390
272	Kensington Microware Ltd	PC Accessories	321
473	PC Cooling Systems	Cooling Device	177
TRAINING SEMINARS			
505	Bantum Books	Book	402
MAIL ORDER			
106	707 Computer Sales	Mail Order	467
521	American Semiconductor	Mail Order	464-465
*	Arlington Computer Products	Mail Order	474-475
*	Bay Express	Mail Order	480
275	Bentley Computers	Compatibles	410-411
125	Boftin Limited	Mail Order	449
481	Bulldog Computer Products	Computer/Accessories	432-433
135	Bus Computer Systems	Mail Order	472
320	Compu Add Corp	Compatibles	161
205	Compuclassics	Mail Order	80
109	Computer Discount Warehouse	Mail Order	466
183	Computer Mail Order	Mail Order	408-409
229	Discount Micro Products	Mail Order	204-205
520	Electronic Wholesale House	Mail Order	480
391	F & W Communications	Mail Order	469
352	FASTMICRO	Mail Order	53
266	General Technology Corp	Mail Order	68
382	Intelligent Microsystems	Mail Order	444-445
243	Jade Computer Products	Mail Order	468
346	Jameco Electronics	Mail Order	477
108	JDR Micro Devices	Mail Order	470-471
387	MHI Warehouse	Mail Order	479
*	MICROBEST	Mail Order	462
344	National Computer Ribbons	Computer Ribbons	473
368	Omega Press	Software Mail Order	63
175	On Line Store	Mail Order	482
301	PC Brand	Mail Order	26
310/311	PC Brand	Clone & Software	22-23
*	PC Connection	Mail Order	222-223
535	PC Network (Formerly IMT)	Mail Order	476
255	Pine Computer	Mail Order	482
293	Printers Plus	Mail Order	315
385	S C S	Mail Order	434
184	Shamrock	Mail Order	478
123	Silicon Specialties	Mail Order	81
*	Softline	Mail Order	84
206	Telemart	Mail Order	44-45
512	The Computer Warehouse	Mail Order	479
268	Tussey Computer Products	Mail Order	66-67
171	Warehouse Data Products	Mail Order	90-91
528	Whole Earth Computer	Mail Order	451
ELECTRONIC MAIL			
484	3X USA	Electronic Mail	78
MISCELLANEOUS			
210	Ashton Tate	Developer s Conference	418
149	Bible Research Systems	The Word Processor	481
DIRECT MARKETING CONNECTION			
106	707 Computer Sales	Mail Order	467
521	American Semiconductor	Mail Order	464-465
*	Arlington Computer Products	Mail Order	474-475
*	Bay Express	Mail Order	480
135	Bus Computer Systems	Mail Order	472
109	Computer Discount Warehouse	Mail Order	466
520	Electric Wholesale House	Mail Order	480
391	F & W Communications	Mail Order	469
243	Jade Computer Products	Mail Order	468
346	Jameco Electronics	Mail Order	477
108	JDR Micro Devices	Mail Order	470-471
387	MHI Warehouse	Mail Order	479
*	MICROBEST	Mail Order	462
344	National Computer Ribbons	Printer Ribbons	473
175	On Line Store	Mail Order	480
535	PC Network	Mail Order	476
145	PC Sig	Shareware	463
255	Pine Computer	Mail Order	482
184	Shamrock	Mail Order	478
512	The Computerr Warehouse	Mail Order	479

Announcing P

PC MagNet is the exciting, new, trouble-free on-line information service that gives you non-stop interaction with *PC Magazine*. Imagine what that means: no longer is your magazine a one-way street. You can download utilities, get more information, find articles in back issues, and connect with *PC Magazine* editors and other readers – at your convenience. Best of all, when you call PC MagNet it's a local dial-up.

The News Gets Better.

PC MagNet is administered by CompuServe, the world's largest commercial on-line information service. All you need is a modem. If you are currently a member of CompuServe, simply type GO PCMAGNET at the ! prompt.

Powerful Free Utilities

PC Magazine's utilities have gained worldwide fame for their speed, power, and ease of use because they help you work faster, better, and smarter. You can move and copy information swiftly and efficiently. Sift through directories easily. Create pop-up help screens. *PC Magazine's* unique programs can help you do all that and much more.

Enjoy Real-time Interaction With Other Readers

Interact with other readers in your specific area of interest. Share a program modification with your peers; unravel, discover, solve, explain, or unlock questions or problems. Like *PC Magazine*, PC MagNet has these special sections:

- Power Programming
- Languages
- Environments
- Spreadsheet Clinic
- Power User
- PC Lab Notes
- PC Tutor
- and more...

PC MagNet is your ideal platform for discussing what was in User-to-User or sharing your latest 1-2-3 macro. And no matter what language you program in – assembler, BASIC, C, or Pascal – PC MagNet is at your service.

And There Is More!

"Sit in on" important conferences with industry gurus, *PC Magazine* editors, and

PC product developers with PC MagNet's real-time Focus Group Facility.

Upload submissions to Connectivity Clinic, Spreadsheet Clinic, User-to-User, Power User, Languages, and PC Tutor.

React to anything you've read in *PC Magazine* by sending a letter to the editor.

C MagNet!

Contribute to the Download libraries.

Send electronic mail to and receive it from other *PC Magazine* readers.

Download the PC Labs Benchmark Series of hardware tests, as well as some of the most popular shareware.

Take Advantage Of This Outstanding New Service Today

PC MagNet opens an entire universe of information and advice, and your on-line time is only $12.50 an hour for round-the-clock access. There are no monthly minimum charges, and you pay only for what you use.

One Call Gets You Started!

You don't need to be an expert at communications to take full advantage of PC MagNet's extraordinary benefits.

1. To subscribe, set your modem to: 300 or 1200 bps, 7 data bits, even parity, 1 stop bit and full duplex. Call one of the numbers listed:

Anaheim, CA	**(714) 520-9724**
Atlanta, GA	**(404) 266-7014**
Baltimore, MD	**(301) 254-7113**
Boston MA	**(617) 542-1796**
Chicago, IL	**(312) 693-0330**
Cleveland, OH	**(216) 771-6860**
Dallas, TX	**(214) 953-0212**
Detroit, MI	**(313) 255-9207**
Houston, TX	**(713) 462-0202**
Los Angeles, CA	**(213) 739-8906**
Miami, FL	**(305) 266-0231**
Minneapolis, MN	**(612) 342-2207**
New York, NY	**(212) 422-8820**
Newark, NJ	**(201) 624-6565**
Philadelphia, PA	**(215) 977-9758**
Pittsburgh, PA	**(412) 391-7732**
San Diego, CA	**(619) 283-6091**
San Francisco, CA	**(415) 956-4191**
Seattle, WA	**(206) 241-9111**
St. Louis, MO	**(314) 241-3102**
Washington, DC	**(202) 388-4280**

(Note: After you have become a member, you can locate a local telephone access number, or 2400 bps service, by typing GO PHONES at the ! prompt.)

2. When you receive a Connect or Carrier Detected message, press Ctrl-C.

3. At the USER ID prompt, type 177000,5000.

4. At the PASSWORD prompt, type PC*MAGNET and press Enter.

5. At the Enter agreement number prompt, type Z10D8813 and press Enter.

6. Register your name and provide billing information.

7. Your personal User ID number and password will be displayed at the end of the subscription process. Please record them in a secure place.

8. A new password will arrive in the mail within 10 days to confirm your subscription.

There are no connect charges for PC MagNet during the subscription process.

AFTER HOURS

Genealogy

(continued)

eration chart—complete with birth and death dates and places—on one 8½- by 11-inch page.

The program allows you to design your own number system for continuation charts, a plus any seasoned genealogist will appreciate.

Family Reunion also prints family group sheets on one page and allows names and addresses for two preparers—a nice touch when the preparer uses information for which another actually deserves credit. The female spouse can be put in the top position—the spot usually reserved for the husband. This is very useful for descendants of a single ancestor.

Another nice feature—full address and phone number fields for living relatives—will appeal to family reunion organizers. One of the program modules generates mailing labels straight from the family file.

Last but not least, *Family Reunion* does a nice job of handling multiple databases—an absolute must for a professional genealogist. One of the program modules allows you to switch to a different database without leaving the program.

Fomily Reunion enjoys an enthusiastic following despite its problems, thanks largely to its elegant printed output and its ability to handle multiple databases with ease.

FAMware should be shipping a faster version of *Fomily Reunion* by the time this issue hits the newsstands. The new version will be compiled with Microsoft's QuickBASIC 4.0, so the speed increase should be substantial.

List Price: *Family Reunion*, $195.
Requires: 256K RAM, two disk drives, DOS 2.0 or later. Not copy protected. FAMware, 1580 E. Dawn Dr., Salt Lake City, UT 84121; (800) 327-9835.

CIRCLE **648** ON READER SERVICE CARD

Family Roots

Fomily Roots, from Quinsept, suffers from some of the same problems as *Family Reunion*, but to a lesser degree.

The documentation is bad, but it's sufficient if you're persistent. The program has different modules for each task, but they load much faster than do *Fomily Reunion*'s. *Family Roots* also insists on a record-number system but, unlike *Family Reunion*, it provides a way to display names opposite record numbers on-screen.

Family Roots takes an odd but quick approach to entering data. Rather than presenting several screens of fields to fill in, the program prompts you to enter as many names as you wish. You then choose an option to begin setting the relationship hooks and filling in biographical information. You can add more names at any time.

Though unusual, this method of adding records seems more natural than trying to fill in all the blanks as you enter a person's data.

Family Roots also streamlines data entry by automating the hooking process a bit more than does *Family Reunion*. For instance, record numbers are needed for hooking, but you can use a name in lieu of a record number temporarily. The program will insert the appropriate record number if you later create a record with that name.

Like *Family Reunion*, *Fomily Roots* allocates a hefty amount of storage for each record. But, in an innovative touch, *Fomily Roots* lets you take advantage of the unused space for adding miscellaneous notes or footnotes on family members. *Fomily Roots* also allows a great deal of flexibility in field entries. You enter as much information as you wish, as long as you don't go beyond the space allocated to that record. Birthplace, for instance, need not be entered in the standard City-County-State format. It could read, "In cab on way to hospital."

You can also print mailing labels from full addresses for living relatives.

Fomily Roots grudgingly prints standard-format ancestor charts, but it really shines when printing what it calls "free-form" charts. Free-form charts sport the same tree structure as ancestor charts but can show a great deal of information or practically no information for each person. Specifying name only, for instance, generates an extremely compact and convenient version of an ancestor chart.

The program recognizes only one database per installation, a limitation that shouldn't hinder hobbyists but will keep professionals away.

List Price: *Family Roots*, $185.
Requires: 128K RAM, two disk drives (hard disk recommended), DOS 1.1 or later. Not copy protected. Quinsept Inc., P.O. Box 216, Lexington, MA 02173; (800) 637-7668.

CIRCLE **647** ON READER SERVICE CARD

Roots II

Roots II, from Commsoft, deservedly ranks as the top-selling genealogy package. Of the packages that are reviewed here, *Roots II* is the most elegant as well as the most professionally prepared.

The *Roots II* program is made up of one well-written executable file and a handful of overlays, so you don't waste time switching among executable modules.

Most important, the program avoids the use of numbers to identify records. Instead, *Roots* combines a nice range of speedy, on-screen searches with the ability to pick records from the screen.

You store up to 40 names at any time into a fetch table, part of which is always displayed at the bottom of the screen. You pick names from the table as you need them—to specify hooks, subjects of ancestor charts, and so on.

Roots II gives up a bit of the flexibility of the other two programs. Whereas the others let you establish parent and child hooks in each record, *Roots* allows only hooks to parents to be set from any record. And, since hooks are made by choosing from the fetch table, you'll have to leave the parent fields temporarily blank if you haven't entered records for the subject's parents.

Genealogy: Tapping the On-line Source

With modems becoming more common among all classes of PC users, genealogists are beginning to turn to several on-line services that are dedicated to putting genealogists in touch with each other.

Two such services—GEnie's Genealogy RoundTable and CompuServe's Roots forum—offer not only areas where users post queries for information on certain family lines, but also on-line chatting, software free for the downloading, and useful bulletins concerning genealogy and genealogy societies.

Another service, the National Genealogy Conference, comprises an ever-growing number of local bulletin boards joined into a nationwide network, and it carries no usage fee. As in the aforementioned services, users are encouraged to leave queries and also to help other users when able.

At last count, over 100 local bulletin boards had joined in the fun, and the list is growing rapidly.

Commsoft began the NGC after starting its own BBS. To find the number for the local NGC-participating BBS nearest you, call the Commsoft BBS at (415) 967-6730 and download GBBS.TXT. —**Mitt Jones**

This can lead to substantial frustration if you're entering large lists of names. The program's speed and otherwise thoughtful design more than make up for this frustration, however.

For instance, nine flags attached to each record let you encode information of your own choosing into files. Flags or combinations of flags can be used to indicate information such as fraternal affiliations, hair color, cause of death, and the like.

A slew of error checks also aids in the data entry process. It "tsk-tsks" about "preemie" firstborn children—a cute way of telling you to check your marriage and birth dates—and points out ancestors who appear to have lived 147 years. *Roots II* also reuses names and locations, saving both disk storage and entry time. Once you've entered "Lyme New London CT," for instance, the program will automatically enter the entire line when you type "Ly" on subsequent entries.

Roots II also provides an abundance of on-screen capabilities that make maintaining and using the data much easier.

Searches by name, date, location, or certain flags yield on-screen lists in a flash. You can then add any of the subjects to the fetch table by pointing to the subject and hitting a key combination.

Excellent on-screen ancestor charts let you run up or down family lines, a big help in avoiding generation gaps. You can also run up and down miniature family group sheets on the screen to check connections.

Roots II will even calculate blood relationships between any two subjects, by either canon or civil law.

Roots does a nice job of compressing data files, allowing several thousand records to be stored on one floppy disk. It can also handle multiple databases, though you must exit the program to change your database. The program's printed reports include everything you'd expect and then some. The family group sheet has loads of information on each person. Each group sheet stretches over several pages. Footnotes are available for referencing and documenting information.

Extremely clear ancestral charts detail five generations and include the spouse of the initial entry. The program automatically numbers and references continuation charts. Ahnentafel charts are surprisingly easy to read.

Family genealogists and historians who intend to publish their findings will like this program. It has the capability to produce camera-ready copy, including text produced on a word processor and linked to appropriate charts. Page numbers can be alternated for back-to-back printing, and you can index the entire print job.

Roots II wins hands down for ease of use and intelligent design. By the time this issue goes to press, *Roots III* should be available. Commsoft was unable to ship the newest version to us in time for inclusion in this review. But if *Roots II* is any indication, *Roots III* should be a winner.

List Price: *Roots II*, $195. **Requires:** 64K RAM (320K recommended), DOS 1.1 or later. Not copy protected. Commsoft, 2257 Old Middlefield Way, Mountain View, CA 94043; (800) 327-6687.

CIRCLE **646** ON READER SERVICE CARD

FITNESS

Stretch Away Your Stress with Pop-up Exercise

BY JENNIFER ZAINO

The on-screen text instructions in Computer Stretches *tell you how to move your body into stretching position. The dots in the drawing designate the areas where the stretch should be felt.*

Your eyes fastened on the screen, you heed the commands to stretch out those hip, back, and neck muscles. Though this may sound like a scene from your favorite video workout, there's no Jane Fonda, Richard Simmons, or VCR in sight.

Instead, you're stretching to the beat of *Bob and Jean Anderson's Computer Stretches*, a memory-resident pop-up program from FB Systems that graphically depicts 14 stretching routines. The exercises are designed to relieve the stress, muscular tension, and pain that can result from sitting for many hours in front of your computer terminal. The $49.95 program is based on Bob Anderson's *Stretching* book ($9.95 from Shelter Publications, Bolinas, California).

You can keep to a daily stretching regimen by defining up to four timers that start *Computer Stretches* automatically throughout the day. If it pops up at an inconvenient time, you can select the Quit option and you'll be bounced right back to your application.

You have the option of choosing A-, B-, or C-level stretches. As you move to the more-advanced levels, more stretches are added, and the amount of time allocated for some of the stretches increases. A beep, which you can turn off, signals when the stretches will begin and end.

Even in EGA mode, *Computer Stretches*' graphics are static and bland. A program of this type could really benefit from even minimal animation to illustrate how to move your body into stretching position. Instead, you have to rely on the manual or the on-screen text instructions to learn how to maneuver your body into the proper position. The parts of the body where the stretch should be felt are marked off with dots in the drawings.

Though *Computer Stretches* did not have any conflicts with memory-resident programs like *SideKick* and *Tornado Notes*, we found that it did cause *XyWrite* to malfunction on three different machines. The company was unable to provide a solution to this problem.

Stretching at regular intervals undoubtedly relieves the strains and pains associated with computer work. And *Computer Stretches*' handy user-definable timers make it a valuable program for those who need to be prompted to keep to a daily stretching routine. However, the program's amateur graphics show that FB Systems settled for something less than a high-energy, high-impact stretching session.

List Price: *Bob and Jean Anderson's Computer Stretches*, $49.95. **Requires:** 256K RAM, hard disk, graphics adapter, DOS 2.0 or later. Not copy protected. FB Systems Inc., 23524 St. Andrews Ct., Auburn, CA 95603; (916) 268-1122. PC

CIRCLE **645** ON READER SERVICE CARD

AFTER HOURS

GENEALOGY

Exploring Your Roots With PC-Based Genealogy Software Programs

BY DIANA ISENRING AND MITT JONES

Whether you're looking for a sense of place in the world or a legacy of fame, chances are you've at least thought about taking the plunge into genealogy. It's unlikely your search will turn up a claim to the Hughes estate, but a well-done search will undoubtedly turn up enough interesting ancestors to make the effort worthwhile.

Genealogy programs are essentially highly specialized database management programs. Unlike your typical database, however, each record in a genealogical database is "hooked" to at least one other record and often many. For instance, a record for a mother of seven children requires hooks not only to the records of her seven children but also to those of her husband and parents.

This highly specialized and intricate structure makes genealogy packages somewhat more complex than a typical database program. It also creates concerns for users of these programs. Setting the hooks, or relationships, among family members can become somewhat of a chore. How each program handles data entry, record searches, and hooks becomes extremely important.

The other major area of concern when shopping for a genealogy package should be the range and quality of the reports the package generates, since good-looking output is probably what you're after in the first place.

Genealogists typically depend on three forms of charts. The ancestor or pedigree chart is what laymen call a family tree. An ahnentafel chart compresses the information in an ancestor chart by removing the branches, making it tough to read but mercifully compact. Finally, a family group sheet shows only the members of one nuclear family—mother, father, and their offspring.

With these features in mind, we rounded up three of the more-powerful and commonly used genealogy packages for the PC. Each package takes a different approach to entering and maintaining the data. Each also offers a feature or two that the other programs don't.

Family Reunion

Family Reunion, from FAMware, offers a handful of useful features, but the program is difficult to install and even more difficult to learn, owing in part to the poor quality of its documentation.

The program's slowness ranks among its biggest problems. Written in BASICA and compiled with IBM's BASIC Compiler, it comprises some 24 separate routines you access via a central menu. Count patience among your virtues if you're not beating your keyboard by the time the program moves from one module to another.

For instance, exiting from the Data Entry module to the main menu took about 15 seconds on my XT compatible. Moving into the Pedigree Print module from there took another 15 seconds.

The program's number-oriented record scheme also contributes to the frustration. All modules make you specify record ID numbers for the records you wish to access or search.

To add insult to injury, you can't even browse through the records that are on the screen to find the ID number for the record you're hunting. Instead, *Family Reunion* allows you to print only an alphabetized index that matches ID number to name. It's a workable but nonetheless irksome solution.

You set relationship hooks when adding or editing an entry by inserting record numbers in the appropriate field. The data entry screen lists several offspring fields for each person, for instance. You enter the record ID for each child into one of the fields. Again, this requires that you know the record number instead of the name.

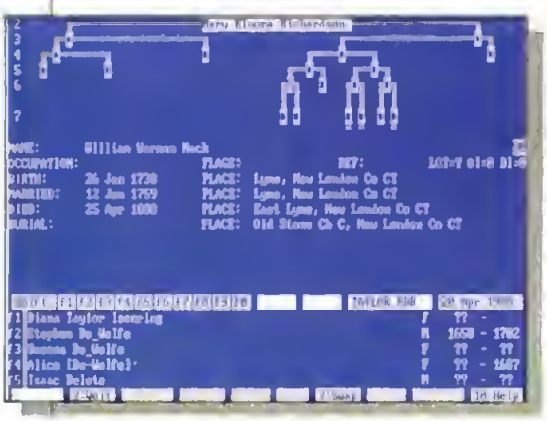
Mercifully, once you put a child in a parent's record, the program will automatically put the parent's record in the child's.

When you add a record, the program takes you through several screens packed with a variety of fields.

This seems at first to be an advantage, since you're likely to find all the fields you need. Whether used or not, however, these fields occupy precious space on your disk. For large databases, the program's space-hogging nature could definitely be a problem.

On the upside, *Family Reunion* produces one of the most elegant computerized six-generation ancestor charts you'll find anywhere. We were able to print a fairly complete six-gen-

(continues)



Up to 40 names at a time can be stored in the Roots II *fetch table, which is always displayed at the bottom of the screen. You can easily pick names from the table as you need them.*

PAF Puts You in Touch with Your Roots

No roundup of genealogy packages would be complete without at least a mention of *Personal Ancestry File* (see After Hours, *PC Magazine*, December 8, 1987). *PAF*, as the program is known in genealogy circles, is a basic but excellent genealogy program designed and sold by the Church of Jesus Christ of Latter-day Saints.

With an estimated 40,000 users, the program boasts the largest user base of any genealogy package for the PC. That's partly because of its price—only $35—but also because of its competence.

PAF won't wow you with a mélange of eye-popping features or fancy output, but it handles basic text entry and output quite nicely.

Should you outgrow its capabilities somewhere down the road, you'll be able to export your data to *Roots II* or *Family Roots* with little trouble. Each offers, at little or no charge, a utility that translates *PAF* files into its own format.

To obtain a copy of *PAF*, call or write: Distribution Center, 1999 W. 1700, South Salt Lake City, UT 84104; (800) 247-3892, ext. 5274; (801) 531-2584. —**Mitt Jones**

INDEX TO ADVERTISERS

RS #	ADVERTISERS	PAGE
267	3M	356-357
484	3X USA	78
106	707 Sales	467
128	Aldus Corp	198-201
345	Alloy Computer	202
242	Alps America	282-283
140	American Power Conversion	388
521	American Semr Conductor	464-465
475	American Small Business	353
185	Aptech	283
111	Arche Technologies	206
527	Archive	314
*	Arlington Computer Products	474-475
324	Ashton-Tate	344-345
210	Ashton-Tate	418
519	Ashton-Tate	376-377
471	askSam Systems	88
230	ASP Computer Products	406
166	AST Research	415
540	ATI Technologies	281
165	Autodesk	313
204	Avery	416
395	Axon	329
505	Bantum Books	402
*	Bay Express	468
172	Bay Technical Associates	176
482	Bedford Software	320
275	Bently Computer	410-411
140	Bible Research	481
216	Bitstream	257
116	Blarse Computer	392
125	Boffin Limited	449
377	Borland	57
137	Borland	55
138	Borland	C2-4
*	Borland	1
296	BSI	420
328	Buffalo Products	426
481	Bulldog Computer	432-433
135	Bus Computer	472
494	ButtonWare Inc	430
160	Centrel Point	74
120	Central Point	75
316	Chinon	191
114	Citizen America	2-3
134	Clarion Software	70
188	Command Technology	428
261	Compact Disc Products	308
279	CompuAdd Corp	166
320	CompuAdd Corp	191
294	CompuAdd Corp	162-165
*	CompuAdd Corp	183-184
205	Compuclassics	80
516	Computer Accessories	88-89
281	Computer Associates	401
109	Computer Discount Warehouse	466
130	Computer Ease Software	316
183	Computer Mail Order	408-409
163	Computer Products United	174-175
225	Core International	291
292	Corporate Software	318
194	Cougar Mountain	371
360	Crescent Software	443
326	Crosstalk	152-153
278	Crosstalk	76
383	Cuesta Systems	323
*	Curtis	336-338
220	DAC Software	89
247	Data Copy	245
504	Datastorm Tech	139
152	Data Technology	355
313	Datavue	399
*	Data World	426
148	dBFast	307
532	DCA/Fox	286-287
531	DCA/Fox	262-263
536	Dell Computer	114-115
539	Dell Computer	112-113
241	Diconix	270-271
229	Discount Micro Products	204-205
330	Dynamic Microprocessor	389
520	Electronic Wholesale	480
257	Entre Computer	217
170	Equinox Systems	456
216	Everex Systems	274-275
159	Everex systems	184
525	Excelltech Inc	448
352	FASTMICRO	53
386	FiveStar Computer	458-459
174	Form Worx Inc	101
112	Fox Software	67
323	Funk Software	82-83
391	F & W Communications	460
146	Gateway Communications	423
740	GE Computer Service	417
522	GeneLogic Systems	481
266	General Technology	68
506	Generic Software	378
239	Genoa Systems	382
360	Golden Bow Systems	4
502	Group L	326
380	Hammerly Computer	330
276	Hauppauge Computer	32
201	Haventree S W	438
136	Hayes Microcomputer	372
357	Hewlett-Packard	104-105
339	Hewlett-Packard	388
124	Hyundai	454
*	IBM Corp	396
265	IDE Associates	136-137
499	IMSI	29
*	Informix Software	180-183
496	Insignia Solutions	407
200	Intergrated Information Systems	21
382	Intelligent Micro Systems	444-445
269	International Battery	390
*	Intuit Software	231
376	Iomega	360
219	Irwin Magnetics	248-249
243	Jade Computer	468
346	Jameco	477
108	JDR	470-471
169	KAO	260
343	KayPro	333
187	Kensington Microware	263
272	Kensington Microware	321
193	Kinson Products	124
341	Lifetime Memory	457
133	Logitech	188-189
182	Logitech	215
*	Lotus	119
*	Lotus	121
*	Lotus	140
*	Lotus	157
*	Lotus	159
*	Lotus	225
*	Lotus	227
*	Lotus	247
263	Macola Inc	442
101	Magnavox	110
224	Mannesmann Tally	194
154	Mathsoft Inc	305
102	May Computer	197
495	Maynard Electronics	430
228	Meridan Technology	133
387	MHI	470
*	MICROBEST	462
302	MicroCom Systems	16
*	Microgratx	92
*	MicroLogic Corp	347
526	Microlytics	185
374	Micronet	422
240	MicroPro	258-259
178	Micronm	424-425
*	Microsoft	C3
*	Microsoft	C5-7
*	Microsoft	327
331	Microway	334
371	Mitsubishi	364-365
350	Mouse Systems	287
373	Mutoh America	285
344	National Computer	473
507	Naturel Microsystem	450
131	NEC Home Electronics	122-123
115	NEC Home Electronics	240-241
147	Netline	455
*	Northgate Computer	404-405
*	Northgate Computer	452
217	Norton-Lambert	20
103	Novell Inc	208-209
235	Okidata	311
368	Omega Press	63
175	On-Line	482
*	Oracle	47
129	Output Technology	322
119	Panasonic	387
381	Para System	72
359	Paradise Systems	125
211	Paul Mace Software	309
310	PC Brand	22
311	PC Brand	23
308	PC Brand	24
309	PC Brand	26
301	PC Brand	28
303	PC Brand	30
304	PC Brand	31
*	PC Connection	220-223
473	PC Cooling	177
372	PC Designs	421
535	PC Network	476
145	PC Sig	453
722	PCC Systems	324
358	Peachtree Software	330
366	Parsoft	243
365	Persoft	64
489	Personal Computer Support Group	16
483	Personal Computer Support Group	11-13
282	Personics	17
*	Personics	406
255	Pine Computer	482
164	Plus Development	294-295
209	Princeton	126
293	Printers Plus	315
529	Public Software Library, The	392
364	Qandu Computing	250
189	Quadram	359
*	Quard Software	304
474	Quarter Deck	69
256	Relay Communications	144-146
348	Research Development	350
327	Revelation Technologies	412
749	Ricoh	211
479	Rightsoft	37
290	Rose Electronics	308
739	Safepower Systems	346
728	Safeware	422
298	Samsung Corp	448
245	Santa Cruz Operation Inc	366
470	SBT	10-16
385	S C S	434
184	Shamrock	478
252	Sigma Designs	441
123	Silicon Specialties	81
478	Softklone	328
*	Softline	64
334	Softlogic Solutions	39
*	Softlogic Solutions	160
726	Software Excitement	318
487	Software Masters	304
488	Software Masters	317
*	Software Publishing	284-285
234	Software Spectrum	391
271	Sony Corp	193
390	Spield Computer	50
319	Sterling Castle	341
*	Sun Microsystems	160
254	Sun Microsystems	170-171
299	Swfte International	109
745	Symantec	45
250	Symantec	58
249	Symantec/Breakthrough	42
173	Sysgen Inc	218
233	Tallgrass Technologies	306
232	Tandon	362-363
206	Telemart	44-45
S12	The Computer Warehouse	478
259	The Laser Connection	5
363	The Software Group	185
393	The Software Link	212-213
191	TOPS	66-67
*	Toshiba	236-237
*	Toshiba	385
231	Touchbase Systems	316
*	Transec Systems	437
222	Traveling Software	325
150	Trutvision Inc	173
268	Tussey Computer	66-67
364	Ven-Tel	14
329	Vertex Systems	233
127	Video-7 Inc	393
171	Warehouse Data	90-91
485	Westlake Data	312
312	White Crane Systems	28
528	Whole Earth Computer	451
513	Wordperfect Corp	348-349
508	Wordperfect Corp	395
734	WYSE Technology	228
518	Xyquest	134
337	Zenith Data Systems	155
325	Zenographics	9
723	Zeos International	79
721	Zeos International	284
316	ZyLAB Corp	431

*—No Reader Service # Please call advertiser for information

PC MAGAZINE ADVERTISING SALES STAFF

Sr. Advertising Coordinator . . . Jane L. Gottlieb
Advertising Coordinator . . . Ursula D. Eckel
1 Park Avenue, New York, NY 10016 (212) 503-5100

Jonathan Lane - Director of Sales
(212) 503-5347
Al Di Guido - Eastern Advertising Director
(212) 503-5100
MA, NH, VT, ME, RI, CT
Rod Conklin - District Manager
Sloan Seymour - District Sales Representative
The Prudential Center
800 Boylston St . Ste 1390
Boston, MA 02199
(617)375-4690
Vickie Pinsky - Account Rapresentative
(212)503-5132
DE, MD, DC, VA, WV, NC, SC, AL, MS, TN, AR, KY, PA, GA, FL
Rex Walker - District Manager
Mary Ariotto - District Sales Representative
3405 Piedmont Road
Atlanta, GA 30305 (404) 239-9780
JoAnn C Ross - Account Representative
(212)503-5130

NY, NJ, PA
Scott Seltz-District Sales Representative
(212) 503-5307
Pat Toohey - District Sales Rapresentative
(212) 503-5149
One Park Avenue
New York, NY 10016
MaryJo Nellson - Account Representative
(212) 503-5128
NE, WI, IL, IN, MN, MO, OH, MI, IA, ND, SD, Canada
Jim Stafford - District Manager
Pete Foster - District Sales Representative
180 N Michigan Avenue Suite 1400
Chicago IL 60601
(312) 346-2600
Valerie Lynch - Account Representative
(212) 503-5126

CA (San Francisco & North), ID, OR, WA, ID
Jay Whitehead - Distnct Manager
Debra Silver-District Sales Representative
110 Marsh Drive Suite 103
Foster City, CA 94404
(415) 378-5520
Mark Crafts - Account Representative
(212)503-5129
CA (Sonte Barbara to So. San Francisco), WY, MT, AK
Gim Talmadge - Distnct Manager
(415) 378-5521
Steve Moorman - District Sales Representative
Kathryn Mandahl - Distnct Sales Representative
110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-5528
Jennifer Long - Account Representative
(212) 503-5127

CA (LA, San Diego & Orange County), AZ, NV, HI
Debre Huisken - District Manager
Robin Kolsky - District Sales Representative
18500 Von Karman Ave Suite 510
Irvine, Ca 92715
(714) 852-8001
Paul Klein - Account Representative
(212)503-5113
TX, OK, LA, KS, UT, NM, CO
Stephen Shore - District Manager
Sandy Schackman - District Sales Representative
5956 Sherry Lane Suite 1330
Dallas, TX 75225 (214) 691-6934
Ilana Morris - Account Representative
(212) 503-5104

GAMES

Hit the Hustings, Shake Some Hands, And You Could Be President

BY STEPHANIE IZAREK

If you think Gary Hart had a scandalous campaign, wait until you enter *your* bid for the presidency in Front Runner Software's new presidential election game, *Campaign Promises*. Tangled affairs, widespread rumors, bribery, sex scandals, and so-called mishaps run rampant in this game, just as they do in a real presidential election.

Test your political prowess and strategic planning against your friends in an exciting race for the ultimate title, the height of bosshood—the presidency. By winning the most electoral votes in each state and by showing no mercy, you will be well on your way to the White House.

There are a total of 538 electoral votes in 51 possible elections. Each of the 51 elections is called separately, and the electoral votes per state equal the number of congressional representatives plus the number of senators. Like a real presidential election, a simple majority is all that is required to win.

The individual elections are won by the Popular vote, which is the summation of the results of the following Vote categories: Campaign Promise Votes, Campaign Organization Votes, Advertising Votes, and Just Plain Luck Votes.

By using the colorful main menu, you strategically select your priority areas. Because Promise Votes often win elections, it is important to have an abundance. You begin the game with three initial promises, chosen from a list of 20, that represent your main concerns and, hopefully, those of the voters. During each election, three promises are randomly chosen by the computer to represent the voters' concerns and are then compared with yours. The matches increase the potential Promise Votes you can earn.

By using the Buy Promises option or by landing on the Promise location during your campaign turn, promises can be purchased at a price randomly selected by the computer, ranging from $5,000 to $50,000.

Don't get sidetracked and spend all of your funds on promises. You'll need your funds to gain votes in the other important categories. You need to set up Organizations in each state to generate more funds. The earlier you establish them, the longer they exist and, therefore, accumulate more money and votes.

Similarly, your Advertising Campaign requires money. Unfortunately, the general rule here is that whoever spends the most money in advertising wins the most Advertising Votes. (Sounds true to life, doesn't it?)

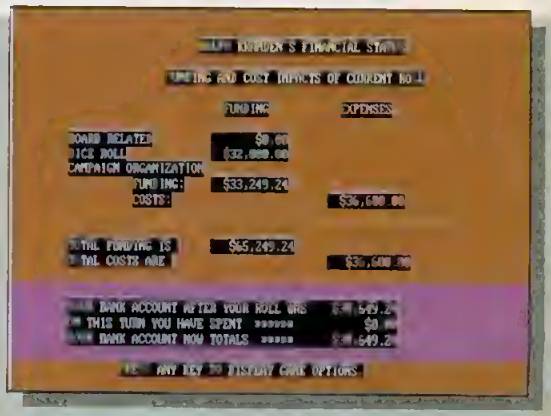
It's important to be frugal with your funds, because if you end up with a negative balance, you will be ineligible to hold an election in the state of your choice.

Basically, the name of the game is to have a well-thought-out strategy, use your wit, and *always* pay attention to the campaign moves the other candidates are making. In political warfare no one can be trusted—especially since *Campaign Promises* includes a nasty option called Dirty Tricks. For a cost, randomly determined, of between $5,000 and $25,000, you can sabotage an opponent's campaign. You can inform the press of unethical contributions, gift improprieties, or marital problems. Or how about having your opponent lose his hairpiece during a key speech? The dirty tricks are handled covertly by your campaign staff and can pop up at any time during the candidate's turn.

Campaign Promises is an exciting and competitive game that displays colorful screens and an easy-to-use menu. You are also provided with an on-screen tutorial and a well-organized manual.

The screen constantly displays flashing words and prompts that can be distracting and annoying. Front Runner also claims that *Campaign Promises* will work effectively on monochrome monitors. This is only partially true. The game will run on a monochrome monitor, but the states and the location board are all color coded. Unless you sit down and memorize the coding system or constantly refer to the manual, the game will become confusing.

Overall, Front Runner incorporates the major concepts of a presidential election and the opportunity to see how deceitful you can be in a creative and challenging game. So, if you think that your campaigning skills are first-rate and that you can do it better than Ronnie, *Campaign Promises* gives you the chance to prove it.



Ralph Kramden for President? As long as he's got enough money to launch successful advertising campaigns, he could win the election in Campaign Promises.

List Price: *Campaign Promises*, $32.95. **Requires:** 256K RAM, CGA or EGA, DOS 2.0 or later. Not copy protected. Front Runner Software, P.O. Box 435, Collinsville, CT 06022; (203) 233-3144.

CIRCLE **649** ON READER SERVICE CARD

AFTER HOURS INDEX

Family Reunion, Family Roots, Roots II
Three programs to track your ancestry and create printed family trees. Plus: on-line genealogy bulletin boards help you swap family info
Computer Stretches
Stretch those muscles with a memory-resident exercise program

"For students, Microsoft® QuickC™ is the ultimate programming environment."

"For my research work it gives me an all-in-one product for development, while providing interlanguage calling as well as compatibility with Microsoft C5.0."

Dr. Kent Chamberlin, University of New Hampshire, Department of Electrical and Computer Engineering.

"With on-line h the clear compiler for our courses."

Greg Tinfow, R & D Engineer, Smart Product Design Laboratory, Stanford University.

"QuickC's built-in graphics, debugger and superb on-line help are formidable features to overcome."

PC AI Magazine (comparing QuickC to Turbo C), Fall 1987, by Brian Flamig, reprinted with permission.

It seems our "C" got an "A".

"If you are new to C, Microsoft QuickC can make the difference between learning C and giving up in frustration."

Jim Nech, President, Houston Area League of PC Users (HAL PC).

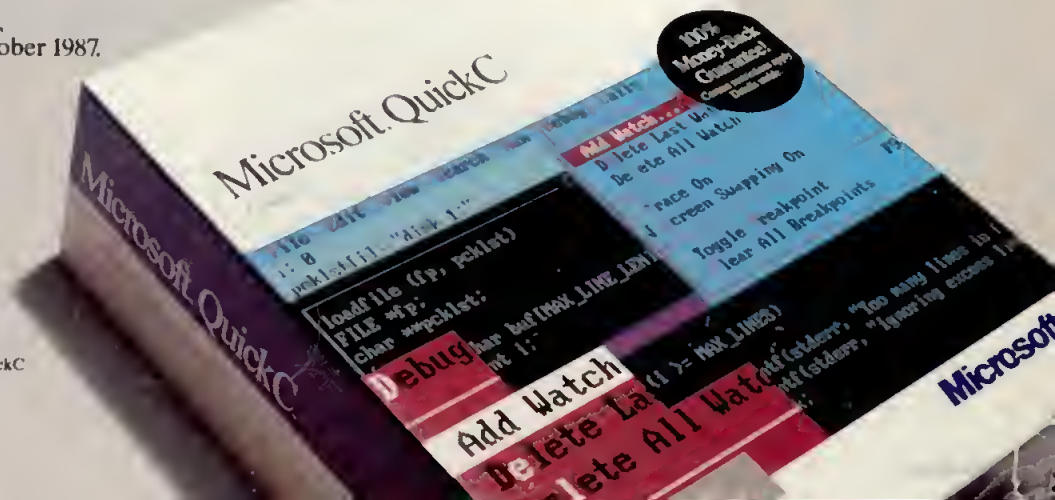
"QuickC is better than Turbo C.® It does everything that Turbo C does, and then some, incorporating very good debugging support that is totally absent from Turbo C."

Alan Holub, Columnist, Dr. Dobb's Journal, October 1987.

Not bad, for a $99 compiler.

Call (800) 541-1261, Dept. E66 and we'll send you a free information packet, including details of how to obtain a TurboPascal® to Microsoft QuickC translator program.

And to make QuickC even more irresistible, how does a 30 day money-back guarantee grab you?



Microsoft is a registered trademark and QuickC is a trademark of Microsoft Corporation Turbo C and TurboPascal are registered trademarks of Borland International, Inc. Offer valid in the 50 United States only

The difference between having power...